AUTOMOTIVE INDUSTRIES

A CHILTON PUBLICATION

AUGUST 1, 1959

Features • • •

VACUUM METALLIZING CUTS COATING COSTS

NEW POLISH VEHICLE FEATURES DESCRIBED

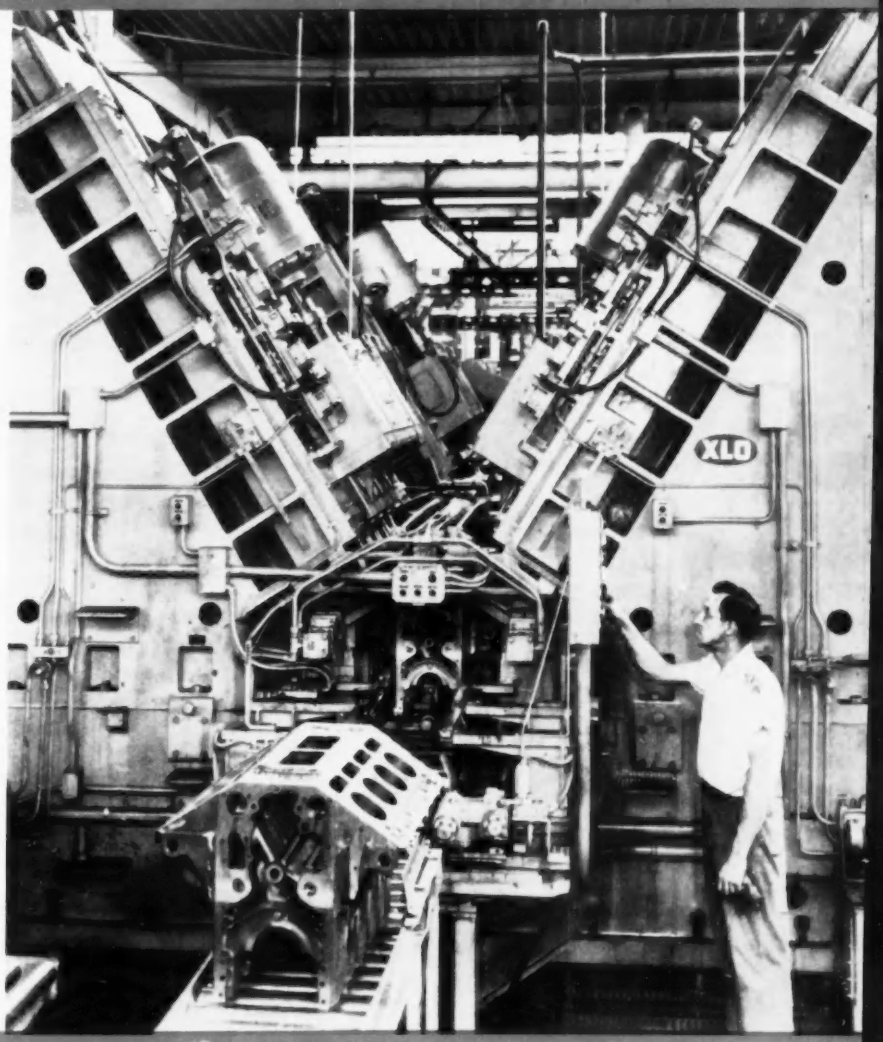
CHEMICALS AND CARS—PROGRESS PARTNERS

DESIGN DETAILS OF NEW AUSTIN A 99

block boring ▶

Detroit Diesel Handles Three Block Sizes in One Cylinder Boring Machine

PAGE 42



Automotive and Aviation Manufacturing

ENGINEERING • PRODUCTION • MANAGEMENT

This Standard Oil product made better grinding possible at Cessna

Aircraft Company's Industrial Products Division licked three problems with ARGON Oil No. 4

Situation: A fluid used in grinding operations at this Cessna plant at Hutchinson, Kansas, was creating three problems:

1) It washed the lubricant from regulator wheels and grinding fixtures, causing them to freeze.
2) It caused build-up of deposits.
3) It stripped paint from machine surfaces.

What was done: Cessna management called in a Standard Oil lubrication specialist who recommended ARGON Oil No. 4 in ratios of 100 and 150:1 for test. The coolant was tested in two centerless grinders for two months.

What happened: All three conditions which were hampering operations were cleared up when the switch was made to ARGON Oil No. 4. Cessna also found that work remained rust-free after passing through the machines, something that had not been the case before. They also found that the coolant didn't foam. With no foam, more of it stayed on the wheel, resulting in cooler operation. Faster cuts were obtained with finer wheels. All 12 grinders in the Cessna shop were then converted to ARGON Oil No. 4.

What you can do: Get more facts about ARGON Oil No. 4 from the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

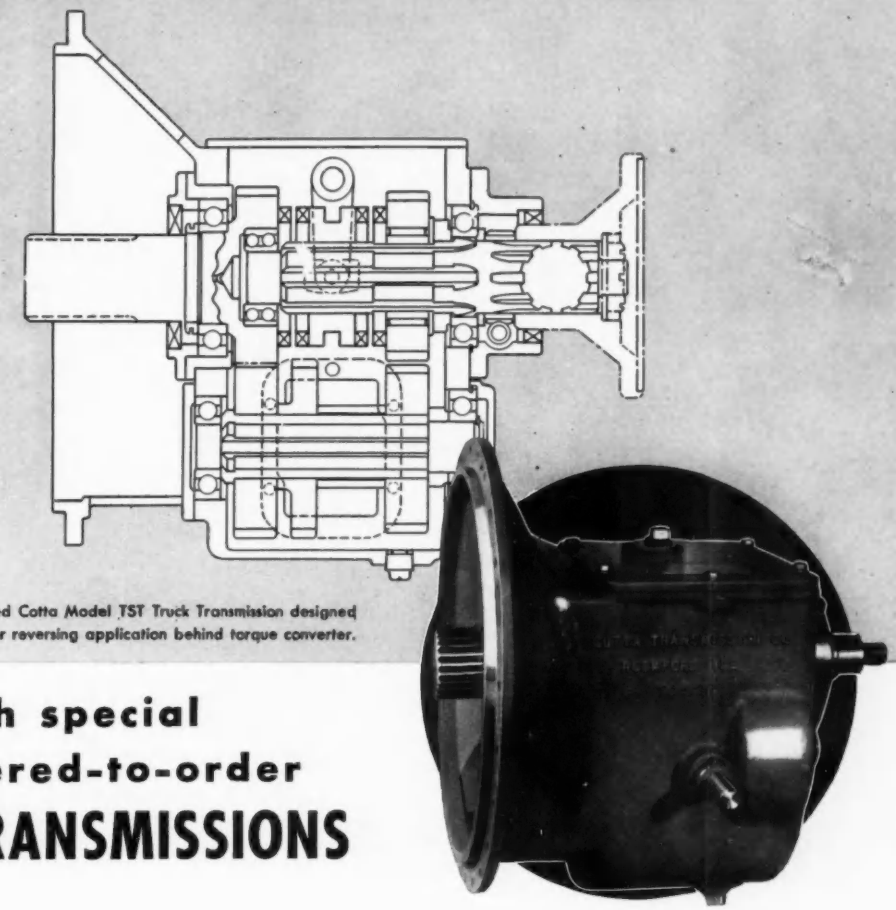
Quick facts about **ARGON Oil No. 4**

• Clear, transparent fluid • Able to control corrosion and rust on work and machines • All chemical. Does not support bacteria growth • Unaffected by humidity • Fire resistant • Odorless

Jerry Croes, Standard Oil staff engineer, Paul Hoyer, Cessna section superintendent and Bill Ray, Standard Oil lubrication specialist (l. to r.) inspect rust-free finish after grinding with ARGON Oil No. 4 while J. E. Petrie (far left), operator, looks on. Both Jerry Croes and Bill Ray have plenty of experience in this sort of work. Jerry has been at it for 16 years. He has an engineering degree from South Dakota School of Mines & Technology and has completed the Standard Oil Sales Engineering School. Bill has six years service working with industrial customers.

You expect more from **STANDARD** *and you get it!*

Deliver big power for big trucks through a wide range of torque conditions



Power-packed Cotta Model TST Truck Transmission designed especially for reversing application behind torque converter.

with special Engineered-to-order COTTA TRANSMISSIONS

Here's another special forward and reverse transmission *built by Cotta* to serve the heavy-duty power requirements of big trucks.

Compact . . . rugged . . . easy to control . . . it provides flow of power through a wide range of torque and speed conditions. At the same time, it has all the *special* heavy-duty features that are Cotta's specialty in the power transmission field!

Operators of railcars, winches, drilling rigs, trucks, hoists and other heavy-duty mobile equipment are enthusiastic about the ease of operation and increased efficiency of these compact mechanical drives.

If you are considering torque converters for your mobile equipment, and you need a special transmission that will stand up *under the long, hard pull* — come to Cotta!

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem — COTTA engineers will help you select the right unit for best performance. May we work with you?

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

COTTA

HEAVY-DUTY TRANSMISSIONS

"Engineered-to-order"

← Circle 101 on Inquiry Card for more data

Circle 104 on Inquiry Card for more data

Trailer constructed of corrugated, strong, nickel-containing stainless steel on top and sides, polished stainless front and rear, has modern good looks. Gives extra years of low-upkeep service. Made by Fruehauf Trailer Company.

Put more sell into trailers with stainless steel

See what you can do with nickel-containing stainless steel to boost cargo space ... service life ... appearance

Look into the dollars-and-cents advantages you can put into trailers with nickel-containing stainless steels:

High strength permits use of lightweight, thin-gauge sections for:

(1) more payload – trailer is stronger, not heavier.

(2) more inside space – wall bracing is compact.

Corrosion resistance gives:

(1) long service life – resists storm, spillage.

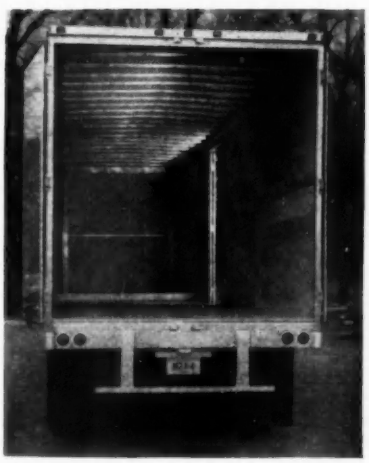
(2) low upkeep – no painting needed; cleans easily.

There are other advantages – tough, hard, nickel-containing stainless steel provides exceptional durability – it's harder to scratch or damage. The corrugations give the unit additional longitudinal strength, rigidity.

You'll likely find several more ways to use low-upkeep, durable, nickel-containing stainless steels. For latest information on these versatile metals, write Inco:

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street INCO New York 5, N. Y.



Rear view, showing corrugated stainless steel roof and bows.

INCO NICKEL

NICKEL MAKES STAINLESS PERFORM BETTER LONGER

Circle 105 on Inquiry Card for more data

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE • PUBLISHED SEMI-MONTHLY

AUGUST 1, 1959 VOL. 121 No. 3

Features • • •

Chemicals and Cars

Advances in automotive engineering are inherently dependent on specialized chemicals and fluids. The intensive research work conducted at Dow Chemical Co. on automotive chemicals exemplifies this close interrelationship. Page 37

Engine Line at Deere Plant

A new assembly line for engines at the John Deere Tractor Works, Dubuque, Ia., incorporates a number of features which increase efficiency of the operation. The ability to produce a range of types and sizes of engines is achieved by using specially built conveyor hangers for holding and carrying cylinder blocks. Page 41

Transfer Machine Line for Diesel Cylinder Blocks

Transfer equipment for cylinder blocks at the Detroit Diesel Engine Div. is designed to handle V-6, V-8 and V-12 cylinder blocks by making minor changes in the equipment. Such changes are affected quite rapidly through the system of controls incorporated in each transfer machine in this line. Page 42

Vacuum Metallizing Automotive Parts

Far-reaching technological advances have aroused increased interest in vacuum metallizing as a low-cost process for finishing automotive parts. These developments are discussed from the viewpoint of their significance to vehicle manufacturers. Present and potential applications of vacuum metallizing are also reviewed. Page 46

Poland's Automobile Industry Grows

The industry is entirely a postwar venture and is operating under a number of handicaps. There are few component makers and sheet steel, and other basic materials are scarce. Despite these drawbacks, production of motor vehicles is showing a steady increase. Page 50

Transmission Control for Tractors

Caterpillar has brought out a finger-tip shifting unit as optional equipment for its DW20 and DW21 tractors. Gear shifting with the new unit is effortless, and is reduced to a fractional-second interval. Page 53

Features of the Austin A 99

The British Motor Corp. has introduced the new Italian-styled Austin A 99 in its bid for economy car sales in North America as well as for the "big car" market elsewhere in the world. Details are given here. Page 54

New Transfer Machine

A 30-station transfer machine for drilling, tapping, milling and sawing main bearing caps at a rate of 436 pieces per hour has been developed by The Cross Co., Detroit. Page 56

34 New Product Items, And Other Features, Such As:

Metals Report, Industry Statistics, Observations, and Automation News Report.

. . . continued on next page

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FROM NEW YORK: "All four of my brakes are always perfectly adjusted whether I'm on the throughway or driving in bumper-to-bumper traffic in the city."

FROM DENVER: "There's new pleasure in mountain driving now that I know my brakes always have maximum stopping power."

FROM ATLANTA: "Knowing our brakes are never out of adjustment gives me a wonderful safe feeling. I'm at ease even when taking the children to school."

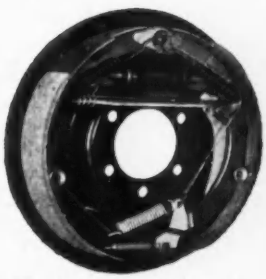
FROM MINNEAPOLIS: "In all kinds of weather, self-adjusting brakes give me stopping power at its best—and save the cost of brake adjustments."

AGAIN . . . BRAKES ARE NEWS IN DEALERS' SHOWROOMS!

Bendix* Self-Adjusting Brakes give dealers a double-barreled sales appeal: safety plus economy. And those in close touch with today's market know that these two appeals —safety and economy—are among the most powerful sales points that can be made to the American buying public.

Car prospects quickly realize that there's real safety in always maintaining the brakes at maximum stopping power. And the obvious savings that they make by eliminating the expense and bother of periodic brake adjustments. What's more, with all brake shoes always correctly adjusted, there's always the right clearance between pedal and floor. And that's a feeling any car buyer appreciates.

Reasons like these make self-adjusting brakes a good "talking piece" for dealers. It won't be long before car buyers everywhere will know about self-adjusting brakes —and want them. But this latest advancement in brakes joins power brakes and power steering as examples of how Bendix pioneers and develops improvements to meet the needs of the automobile industry.



When shoe clearance exceeds a predetermined amount, a ratchet sets up the star wheel adjuster one notch—as the brakes are applied when the car is in reverse. This automatically adjusts the shoes to exactly the right fit within the drum and compensates for lining wear.

*REG. U. S. PAT. OFF.

Bendix PRODUCTS DIVISION South Bend, IND.

Bendix AVIATION CORPORATION

Circle 106 on Inquiry Card for more data

There is NO SUBSTITUTE for a forging: NO SUBSTITUTE for Wyman-Gordon Experience

There is more to the superiority of the forged crankshaft than just strength.

No other method of fabrication can compare with the forging process for dependability. The uniformity and predictability of physical properties with minimum variance from piece to piece or from one location to another in the same piece is assured to the greatest degree by modern forging practice.

Top automotive engineers agree that the use of a forged crankshaft permits the design of a more compact engine which is a decided advantage when thinking in terms of limited space available and overall engine weight reduction.

As compression ratios increase and engine outputs go up the risk factor must be reduced. Again, the uniformity of quality in the backbone of the engine, the crankshaft, is most essential and made possible only by a forging.

There is NO SUBSTITUTE for a forging and in a forging there is NO SUBSTITUTE for WYMAN-GORDON quality and experience.

WYMAN-GORDON COMPANY

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS

HARVEY, ILLINOIS • DETROIT, MICHIGAN

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IN THE MINDS OF ENGINE MAKERS...

FRAM RANKS *FIRST!*

More engine makers install FRAM at the factory than any other filter. Over 400 of them now rely on FRAM—for original filter research and development... for highest quality filter construction and material... and for professional advice on all filtration problems!

Anyway you look at it... FRAM ranks first!

- More drivers prefer FRAM than any other brand!
- More car makers install FRAM as original equipment!
- More than 400 engine manufacturers specify FRAM —more than any other filter!

FRAM CORPORATION, Providence 16, R.I.

FRAM
OIL · AIR · FUEL · WATER
FILTERS

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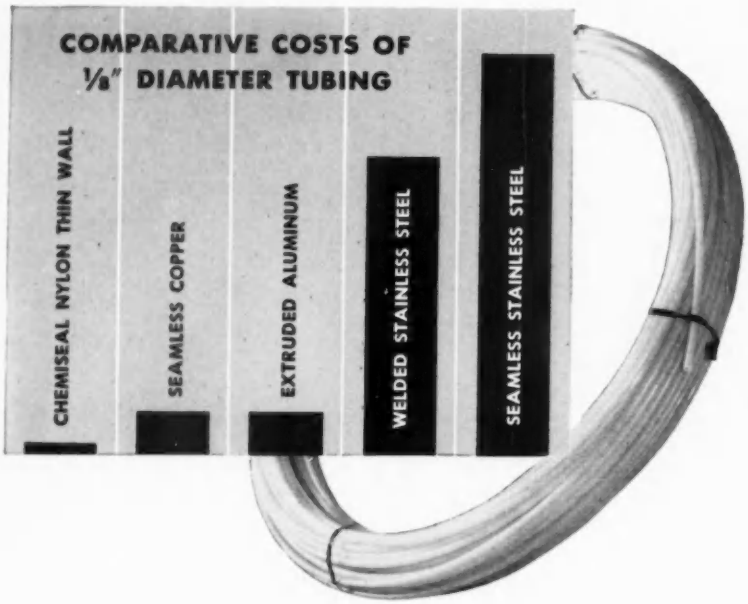
Chemiseal®

NYLON PRESSURE TUBING COSTS LESS... *Performs Better than Metal*



A decisive cost advantage of CHEMISEAL Nylon Pressure Tubing is shown in this graphic relationship to other tubing materials. Seamless copper and extruded aluminum cost approximately four times as much, while welded and seamless stainless steel costs 29 to 37 times more, respectively. Also, the cost of couplings and installation labor should be considered—CHEMISEAL Nylon Pressure Tubing needs no intermediate couplings or fittings . . . is simple to install. You save on first cost, fittings, and labor.

On the job, other materials don't compare. CHEMISEAL Nylon Pressure Tubing is unaffected by lubricants, alkalies, acids, solvents. It can be twisted, bent, flexed into any position—will resist abrasion, impact, vibrational fatigue. CHEMISEAL Nylon is serviceable from −60° F. to +180° F. (can be heat stabilized for 300° F.); available for 1000 and 2500 psi, conforming to J.I.C. specifications. Diameters range from ⅛" O.D. to largest size commercially made, depending on customer needs.

Discover how you can use CHEMISEAL Nylon Pressure Tubing. Contact one of The Garlock Packing Company's 30 sales offices and warehouses throughout the U.S. and Canada, or write for Bulletin NPT.

THE GARLOCK PACKING COMPANY, Palmyra, N. Y.

United States Gasket *Plastics Division of* GARLOCK

CALENDAR

OF COMING SHOWS AND MEETINGS

SAE International West Coast Meeting, Hotel Georgia, Vancouver, B. C.....Aug. 10-13

Western Electronic Show and Convention, San Francisco, Calif. Aug. 18-21

10th International Congress of Applied Mechanics, Congress Building, Stresa, Italy Aug. 31-Sept. 7

14th National ACM Conference Massachusetts Institute of Technology, Computation Center, Cambridge, Mass.....Sept. 1-3

Society of British Aircraft Construction, 20th flying display and exhibition, Royal Aircraft Establishment, Farnborough, England .....Sept. 7-13

Society of the Plastics Industry, Inc., Midwest Section Conference, French Lick Sheraton Hotel, French Lick, Ind....Sept. 10-11

National Auto Accessory and Parts Exhibit, Las Vegas, Nev...Sept. 14-17

American Die Casting Institute, annual meeting, Edgewater Beach Hotel, Chicago, Ill.....Sept. 16-17

National Petroleum Association, annual meeting, The Traymore, Atlantic City, N. J.....Sept. 16-18

National Industrial Conference Board, 7th marketing conference, Hotel Waldorf-Astoria, New York, N. Y.....Sept. 16-18

International Automobile Show, Frankfurt, Germany .....Sept. 17-27

Steel Founders' Society of America, 57th fall meeting, The Homestead, Hot Springs, Va....Sept. 21-22

Instrument Society of America, 14th annual instrument-automation conference and exhibit, International Amphitheater, Chicago, Ill. .....Sept. 21-24

Industrial Nuclear Technology Conference, Morrison Hotel, Chicago, Ill. .....Sept. 22-24

American Welding Society, national fall meeting, Sheraton-Cadillac Hotel, Detroit, Mich....Sept. 28-Oct. 1

Paris Automobile Show.....Oct. 1-11

Institute of the Aeronautical Sciences, Anglo-American Conference, Hotel Astor, New York, N. Y. .....Oct. 5-16

American Vacuum Society, sixth national symposium on vacuum technology, Sheraton Hotel, Philadelphia, Pa. .....Oct. 7-9

ASTE semi-annual meeting, Chase-Park Plaza Hotels, St. Louis, Mo. .....Oct. 8-10

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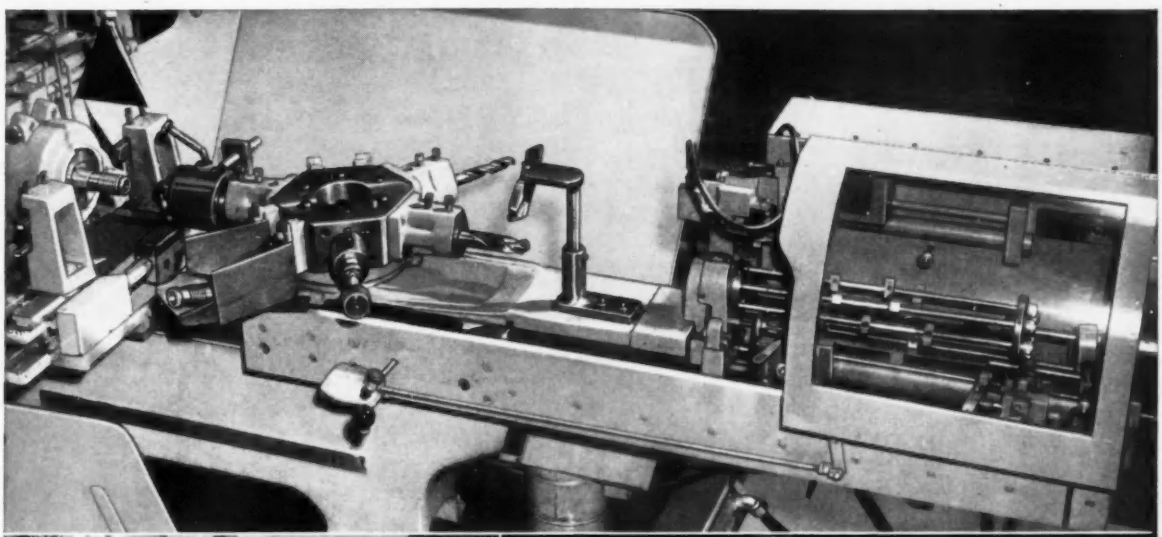
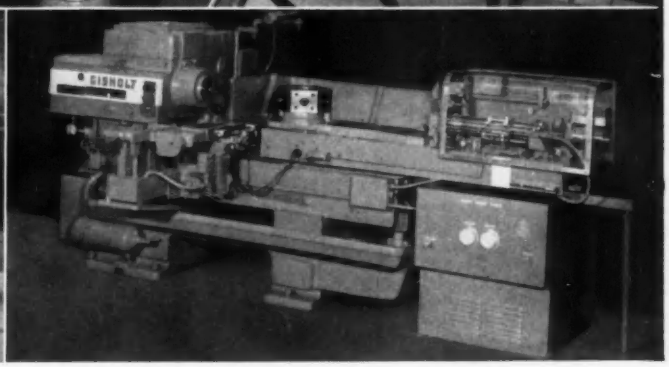




250% Production Increase with this setup

Gets full automation on small job-lot production runs using hydraulic drive on Gisholt Ram Type Turret Lathe

Floor-to-floor time on the job shown here—a threaded collar $3\frac{1}{8}$" long with $1\frac{11}{16}$" diam.—was cut from 8.1 minutes (with hand operation) to just 3.25 minutes. All operations and machine functions are automatically controlled with the Lynn Hydraulic Drive Unit on a Gisholt Ram Type Turret Lathe.

Here's how the finished workpiece is completely machined from bar stock in one fast, automatic operation: The stock is fed pneumatically against a turret stop, chucked, start-drilled, then finish-bored with a large drill. The hydraulic drive backs the drill out automatically to clear the chips, then rapid traverses back to where it left off before dropping into feed to resume drilling. Spindle speed automatically decreases as tools on the front cross slide form the O.D., drops into lower speed as O.D. is threaded, and into another low speed as radii are formed on the finished part and on the end of the bar stock. A tool on the rear cross slide cuts off the finished part and the job is done in record time.

With its massive design, reserve power and extra spindle speeds, the new Gisholt MASTERLINE Ram Type Turret Lathe is particularly adaptable to complete automatic operation with Lynn Hydraulic Drive. Contact your Gisholt Representative. He has the complete facts—and his wide experience may point the way to more profitable operation for you.

MASTERLINE GISHOLT SINCE 1887 GISHOLT

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

WRITE GISHOLT TODAY for all-new, 18-page illustrated Bulletin 1174-B covering features, accessories, tools and floor plans on new Gisholt MASTERLINE Ram Type Turret Lathes.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY REBUILT MACHINES WITH NEW MACHINE GUARANTEE

Huge trailer built stronger . . .

Framework of 32-ton trailer using extra-strong USS "T-1" Constructional Alloy Steel for main members and USS MAN-TEN High Strength Steel in the cross

Bigger equipment demands stronger trailers built with least possible weight. USS Special Steels fill the bill.

. up to 5000 pounds lighter

members. Floorplate is USS Multigrip.

with USS "T-1" and MAN-TEN Steels

With construction equipment being built bigger to do more jobs, transporting it becomes a problem. Trucks are hauling more weight; and trailers must be stronger. Yet total weight must be within limits set by state laws.

The Hyster Company, Martin Trailer Division, Kewanee, Illinois, is solving this problem by using USS "T-1" Constructional Alloy Steel for the main frame members of their trailers and USS MAN-TEN High-Strength Steel for the cross members. "T-1" steel has a minimum yield strength of 100,000 psi. MAN-TEN Steel's minimum yield point is 45,000 psi in the thicknesses used. The combination provides great strength with a weight savings of 1500 pounds to 5000 pounds dependent on the model.

Martin's 32-ton and 40-ton models are providing customers with some real savings. The trailers pay for themselves because of lower weight, faster trips, lower fuel requirements for tractors and, of course, increased pay load. Martin makes trailers up to 100 tons capacity.

USS "T-1" Steel pays off. Mr. Rex A. McCormick, Assistant Sales Manager for Martin, says, "The end result of using extra-high-strength steel is worth what it costs. Reception of the "T-1" units has been enthusiastic . . . so much so that we can't keep up with the demand."

If you are building any equipment, mobile or stationary, that must be made stronger, lighter and more resistant to impact abrasion or corrosion, find out how these special steels can help you—USS "T-1," MAN-TEN, COR-TEN and TRI-TEN. All are weldable—all have special properties that result in longer service life and lower operating costs.

USS, "T-1", MAN-TEN, COR-TEN, and TRI-TEN are registered trademarks

USS

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Ala.
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

"Wood Be" torsion suspension by Mather about 475 B. C.

LET MATHER SOLVE YOUR SUSPENSION PROBLEMS, TOO

Confucius's contemporary contraption really isn't confusing. It will work . . . its design is based on the proven principles of torsion suspension engineered by Mather.

We have the experienced manpower, the research, design and manufacturing facilities to help you with your specific suspension needs.

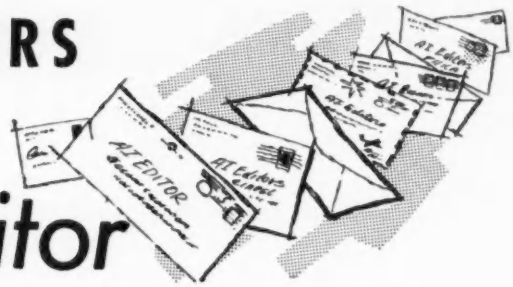
Why not put our 50 years of experience to work. We'll welcome the chance.

MATHER

THE MATHER SPRING COMPANY

TOLEDO, OHIO

LETTERS to the Editor



Readers' opinions or requests for additional information on material appearing in the editorial pages of AUTOMOTIVE INDUSTRIES are invited for this column. No unsigned letters will be considered, but names will be withheld on request. Address *Letters to the Editor*, AUTOMOTIVE INDUSTRIES, 56th & Chestnut Sts., Philadelphia 39, Pa.

NATIONAL SECURITY

The Industrial College of the Armed Forces is now offering a correspondence course entitled "The Economics of National Security." This course is available without charge to qualified civilians and officers of the reserve and regular establishments. Full information will be supplied on request to the undersigned.

George W. Mundy
Lt. Gen., USAF
Commandant
Industrial College of the Armed Forces
Washington, D. C.

MILITARY VEHICLES

The editors of AUTOMOTIVE INDUSTRIES did nobly in the July 1 issue. Thank you so much for the generous recognition you gave the Ordnance Association for its part in arranging the papers at our Combat Vehicles Division meeting in Detroit. Let me congratulate you, too, on the excellence of the entire issue.

Leo A. Codd
Executive Vice President
American Ordnance Association
Mills Bldg.
Washington 6, D. C.

NEW AI FEATURES

Thank you for your letter about new features of AUTOMOTIVE INDUSTRIES magazine. We are delighted to learn of these features and will see to it that you get appropriate material from us.

William A. Lashley
General Manager
Public Relations
Reynolds Metals Co.
Richmond 18, Va.

NEW AI FEATURES

Thank you for writing to us about the new features of AUTOMOTIVE INDUSTRIES. I also was glad to receive a copy of the July 1 issue. The format, pictures, and material certainly are increasing the appeal of the publication.

Earl O. Ewan
Public Relations Dept.
United States Steel Corp.
New York 6, N. Y.

ADHESIVE BONDING

We certainly appreciate your cooperation in sending us a copy of the July 1 issue containing Part I of the article "Cutting Costs with Adhesive Bonding." This is, indeed, a splendid presentation. We will certainly want reprints of it for dissemination to our field force after Part II appears.

Bernard Gould, Mgr.
Market Development
Rubber and Asbestos Corp.
Bloomfield, N. J.

Part II was published in the July 15 issue.—Ed.

SKYWARRIOR STORY

One of our customers in Switzerland would like to obtain a photostatic copy of the article entitled "The A3D Skywarrior on the Production Line," which appeared in the August 15, 1957, issue of AUTOMOTIVE INDUSTRIES. If it is not possible for you to furnish the above, please grant permission for us to have one photostatic copy made from a library copy of the periodical for our customer in Switzerland.

Charles A. Herbert
Research Service
353 West 57th St.
New York 19, N. Y.

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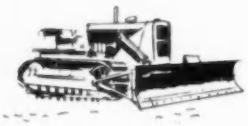

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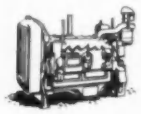

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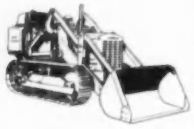

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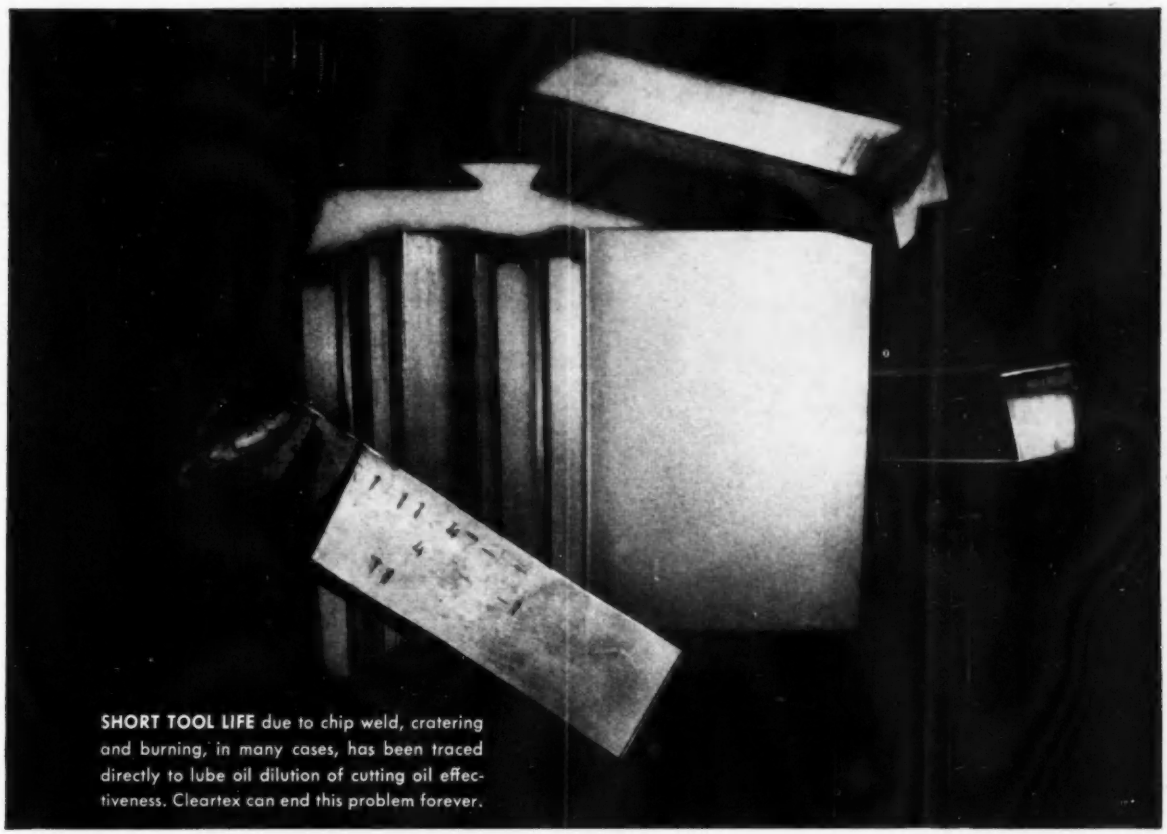

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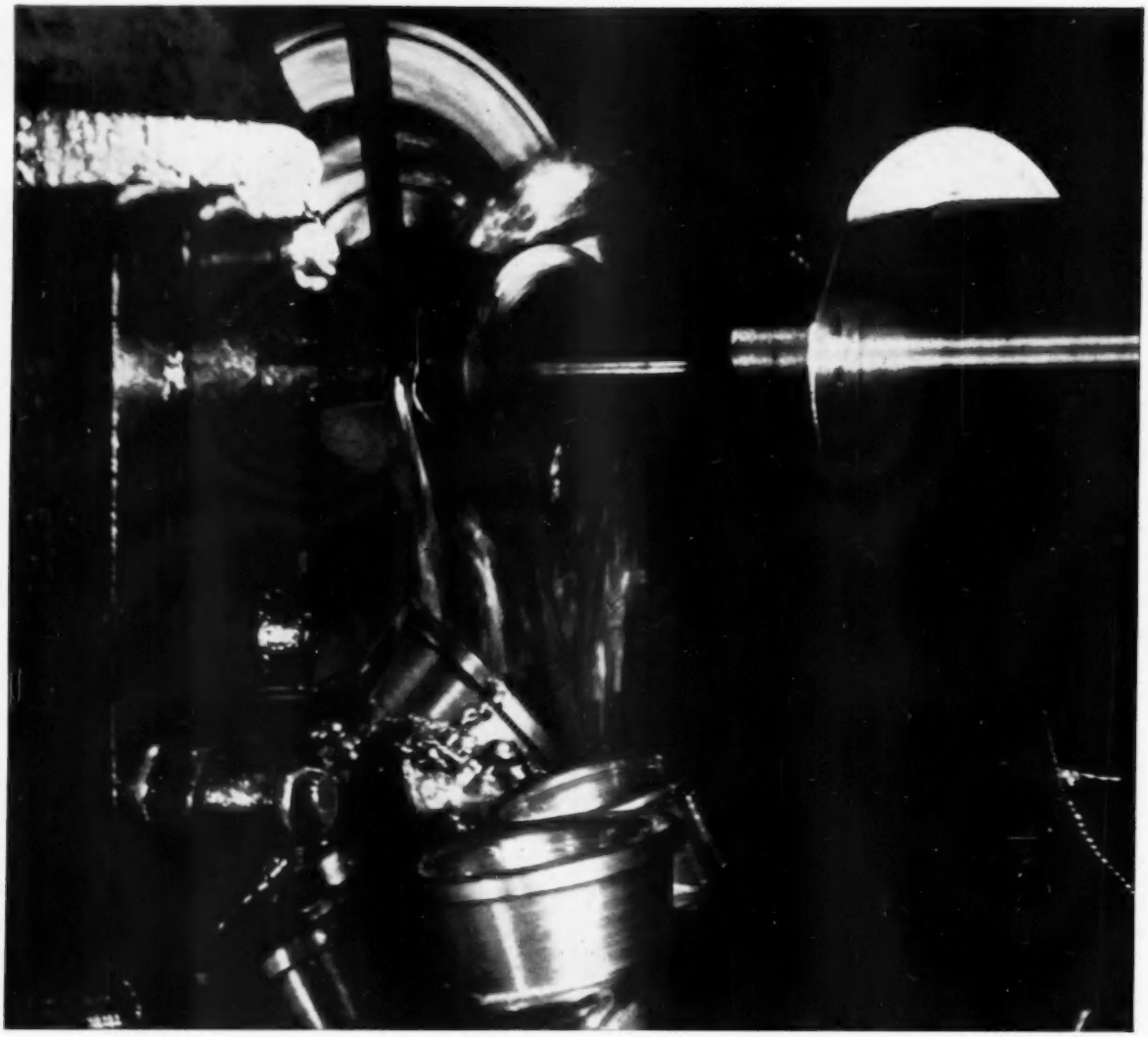

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NEWS

Vol. 121, No. 3 August 1, 1959

Taxicabs Go Diesel

More Operators Make Switch As Engines Prove Their Efficiency

Diesel taxicabs on American city streets soon may be more than just an engine builders' pipe dream. With hundreds of thousands of test miles on log, several fleet operators are switching to Diesel taxicabs on a permanent basis.

Diesel cabs now are operating in most major American cities, including Detroit, San Francisco, Los Angeles, New York, Atlanta, Indianapolis, Chicago, South Bend and Kansas City. Many of these are test units but at least half are considered "regulars." And now that operators have had a chance to compare, the growth of the Diesel fleet is expected to be rapid, reaching 1000 vehicles within two years.

Future Looks Good

Thoroughly convinced of the Diesel's future is Marvin Wildt, partner in a 57-cab Checker fleet in Detroit. He and Charles Ross now have 16 Perkins-powered Plymouths, and Wildt says that from now they are buying nothing but Diesels.

All this is good news to Ken Brown, Inc., Detroit Dodge-Plymouth dealer who has an exclusive agreement with F. Perkins Ltd. of Peterborough, England, to install the Perkins P4C four-cylinder Diesel in Plymouth taxis. So far, Ken Brown has converted 50 Plymouth taxis, including Wildt's 16 and eight others now collecting fares in Detroit.

Another interested party is Studebaker-Packard Corp., which is distributing Mercedes-Benz Diesel taxicabs in this country. The firm has placed nearly 50 M-B 180D cabs around the nation, including four cars under factory surveillance since April, 1958, in South Bend, Ind.

Others are behind the move. Detroit Diesel Div. of General Motors is offering its three-cylinder engine for taxicab use. Six-cylinder Perkins Diesels are under test. Ford and Chevrolet taxicabs have been converted for test runs.

Reasons for Switch

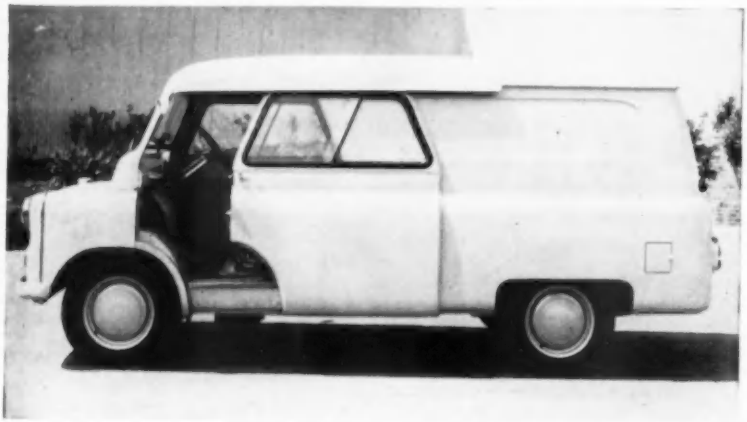
There are two main reasons for the switch. One is lower fuel cost with better mileage. The other is lower maintenance cost on such major components as brakes, transmission, clutch, drive line and body, because jack-rabbit starts are not possible.

Studebaker-Packard made its first full check on the four test Diesels after the cars had run up between 48,000 and 60,000 miles. The Diesels averaged 23 mpg on city driving and idle and 35 mpg on suburban runs. Standard cabs on the same runs averaged 10 and

ANGLO-IRISH CAR AIMED AT U. S. MARKET

The Shamrock, a sports car with an all-plastic body, is aimed primarily at the U. S. market. It will be assembled in Eire from main parts and materials made in Britain. The four-passenger car is built on a 98-in. wheelbase and is powered by a four-cylinder overhead valve engine. A prototype has been demonstrated in England.

NEW BRITISH VAN HAS INCREASED CAPACITY



Latest Bedford panel van, made in Britain by GM, has a longer wheelbase and more cargo capacity than previous models. The 102-in. wheelbase on the van shown here is 12 in. greater than the short version, and load space is enlarged by 20 per cent to 171 cu ft. Payload ratings of a half- and three-quarter ton are unchanged.

16 mpg respectively, S-P found.

The results confirmed findings reported by Wildt for his Detroit operation. His figures: 19-26 mpg for Diesels, with some going as high as 36, compared with 10-12 mpg for his standard cabs.

S-P found it costs 2.6¢ a mile to operate the M-B 180's, including upkeep and fuel, while the gasoline cabs cost 4.4¢ a mile to run. None of the four cabs required major repairs during the 15-month period, and a company spokesman says no repairs were indicated for the near future. Brakes were relined at 40,000 miles to meet insurance requirements.

Initial Cost Higher

Initial cost, of course, is higher. Ken Brown will convert a standard six-cylinder Plymouth for $795 plus engine exchange. But Wildt says he expects to run his Diesel cabs longer than is normal for gasoline taxis. He says the cost is recovered in the first eight or 10 months of operation.

Actual conversion involves very few mechanical changes, according to Ray Penny, expediter on the dieselization project at Ken Brown. Engine mounts are replaced, and front mounts relocated on the cross-member. A primer valve for cold weather starting, a choke-out stop button and an idle control knob are mounted to the dashboard. And that's it.

Ken Brown expects a lull from now until fleet buying begins again in October, but a sharp upturn is expected now that Diesels have had a chance to prove themselves on high mileage tests. The company has converted as many as five cars a week, and delivered about 15 a month in recent months. In the fall, automatic transmissions will be available as well as standard, according to Penny.

Rambler Sets Record

American Motors hit an all-time record for Rambler production the week ended July 18 when 10,181 cars were built. The previous high was 9705 the week of May 23. AMC expected to taper off from its high week to shut down the first part of August for model changeover and annual vacation.

Second Small Ford Planned for Canada

Ford Motor Co. of Canada will bring out a second small car line this fall to be marketed by Meteor and Mercury dealers. The car, called Frontenac, will be a restyled and upgraded version of the 109 in. wheelbase Falcon, which Ford will build at Oakville, Ontario. Rhys M. Sale, president of the Canadian company, says the new car will be "distinctively Canadian in both styling and workmanship."

Renault Has Peak Sales

Renault reports record sales of 40,663 cars in the U. S. during the first half of 1959, compared with 17,446 sold in the like period a year ago.

June sales totaled 8295, a new monthly record. This is 2½ times the June, 1958 sales of 3463 cars and nearly 15 per cent more than the 7281 sold in May, 1958, the previous monthly high.

Meanwhile, European carmakers continued to gain ground in this country. European imports in May totaled 64,553 cars with a dollar value of $69,290,188, according to figures released by the Automobile Manufacturers Association. For the first five months of 1959, imports totaled 273,859, with a dollar value of $306,555,329, the AMA reported.

No Change in VW

The Volkswagen will continue in its current form until at least 1961.

That's the implication of a recent statement by Dr. Heinz Nordhoff, managing director of Germany's largest automobile firm.

The existing models would not undergo any basic changes until 4 million had been turned out, Dr. Nordhoff said. At present rate of production this would take another two years.

One of the major problems of a model change would be to provide service facilities and spares for the millions of identical VWs already in use. It is understood that the company is building a new plant exclusively for parts for the present vehicle. This will relieve the main Wolfsburg plant of this burden.

Last year Volkswagen turned out 553,399 vehicles—a 17 per cent rise over 1957. Turnover amounted to $520 million—up 20 per cent over the year before.

Ford Used Car Warranty

Ford Div. has instituted a new "performance protection policy" for used cars and trucks sold by Ford dealers and bearing an "A-1" symbol. The universal warranty covers used vehicles for 30 days or 1000 miles for necessary repairs or parts replacements at 50 per cent of retail.

Austin-Healey "3000"

British Motor Corp. has unveiled its new Austin-Healey 3000 sports car in this country.

The 1960 model succeeds the 100-Six and will be sold by a network of nearly 700 dealers through Hambro Automotive Corp., BMC's U. S. representative.

The 3000 is powered by a six-cylinder ohv engine developing 130 bhp at 4750 rpm. Displacement of the engine—an advanced version of the C-type unit — has been upped to 177.7-cu in.; compression ratio to 9.03 to 1; and maximum torque to 175 lb/ft at 3000 rpm.

Car is available in 2- and 4-passenger models and with a removable fiber glass hardtop in addition to the standard fabric top. It is built on a 92-in. wheelbase and has an overall length of 157.5 in.

New Austin-Healey 3000 sports car succeeds the 100 Six

High Earnings Posted By Car Companies

American Motors

Record unit sales pushed earnings to an all-time high of $49.6 million during the first nine months of the current fiscal year, or more than triple the corresponding figure for last year. Noteworthy is the tax comparison—$36 million paid out in income tax this year against no taxes at all a year ago.

Sales for the nine months totaled $688.7 million, nearly double the $358.5 million in 1958. Unit sales soared from 123,906 to 276,509 Ramblers.

For the June quarter, earnings amounted to $16 million, after $20 million in taxes, compared with tax-free $7.2 million in 1958. Sales during the three-month period were $226.2 million, against $131 million a year ago. Unit sales jumped from last year's 54,359 to 121,589 for the period.

Chrysler Corp.

Chrysler posted earnings of $58 million on sales of $1,531 million (up 42 per cent) during the six months through June 30. A year ago, the company had sales of $1,075 million and a net loss of $25.2 million for the same period.

In the April-June quarter, Chrysler's earnings of $42 million were second only to 1957's $43 million.

Car and truck sales for the six months totaled 509,244 units, plus 30,310 Simca cars and trucks, new to the corporation since last year. A year ago, Chrysler sold 374,222 vehicles.

Studebaker-Packard Corp.

Although sales and earnings fell off during the second quarter, Studebaker - Packard Corp. still wound up the first half of 1959 with plus figures. For the period, the company posted earnings of $12 million on sales of $209.8 million. For the second quarter, the totals were $4.3 million on $94.3 million.

For the first six months, sales are nearly triple the $70.6 million posted a year ago, and earnings were non-existent then. Lark sales through June 30 totaled 126,256 units, 124 per cent greater than all passenger car sales for the entire 1958 model year. Truck sales also showed a 33.8 per cent increase over 1958.

S-P sales of the German Mercedes-Benz line were more than double 1958. Factors which will figure in the second half of 1959 are sales of the low-priced DKW automobiles and the newly-acquired Gering Plastics Div.

Ford Motor Co.

Ford Motor Co. posted record earnings of $151.1 million for the second quarter of 1959, making a six-month total of $285.9 million. A year ago, Ford lost $13.7 million the second quarter and ended the half-year with a $16.1 million profit.

Ford's record earnings were based on sales of $2,954.3 million the first half of 1959, including sales of $1,479 million the second quarter. A year ago, six-month sales were $1,987.3 million and second quarter sales totaled $891.5 million.

Jeeps for Japan

The Willys licensee in Japan, Mitsubishi Heavy-Industries, Reorganized, Ltd., will build 4341 quarter-ton Jeeps for the Japanese Army and other countries of the Southeastern Asia Treaty Organization. The $6 million order was placed by the U. S. Army Procurement Agency in Japan.

NEWS

CONTINUED

Carmakers Go Ahead With Plans For 1960 Model Production

Carmakers, prepared for a long steel strike, are proceeding with plans for 1960 model production.

The strike, of course, surprised no one and the result is a sizeable steel stockpile that should carry the industry through the crisis.

All of the carmakers indicate they are prepared to last beyond September. Chrysler says it has enough steel to last "through mid-November"; Ford enough to take it "substantially into 1960 production"; and AMC "comfortably into 1960." General Motors claims that "production is protected."

Key to the situation, of course, is availability of steel to parts suppliers. Chrysler says its suppliers have advised the company that they have enough steel to last through mid-November. Ford reportedly has enough steel, along with its suppliers, to go 60 days into 1960 production. One GM passenger car division says it can last through October, another 90 days into '60 production.

Ford, of course, still is producing steel at its Rouge mills in Dearborn, since the UAW workers there are not affected by the steel strike. During the latter part of July, the Ford mill was working at better than 100 per cent capacity. Ford produces 35 per cent of its own steel requirements, but cannot supply all types of stock.

Axle Plant in Brazil

Pilot production is under way at a new $10 million truck axle plant built jointly in Sao Paulo, Brazil by Rockwell-Standard Corp. and Companhia Brasileira del Material Ferroviario. The new company, known as Cobrasma Rockwell Eixos S.A., occupies a 250,000 sq ft plant designed to produce all types and sizes of truck axles and gears for transmissions or axles built in the U. S. or South America. Gear production capacity is approximately 30,000 a month.

The plant is equipped with 98 per cent U. S. built machine tools at an investment of some $7.5 million, according to Rockwell-Standard.

Ford's Payroll Jumps

Ford Motor Co. total payroll for the first half of 1959 jumped to $561 million, an increase of $120 over the same period last year. Average gross hourly earnings hit an all-time high at $2.84, compared with $2.61 a year ago. In the Detroit area, the average gross earnings of hourly employes climbed to $2.87 an hour, well over last year's record of $2.66. Total average employment for the six months was 159,131, up nearly 18,000 over 1958.

Two-Tones Popular

Dodge Div. reports 64.4 per cent of the 1959 model customers have specified two-tone finishes, five per cent above last year. By model, 72 per cent of Royal orders call for two-tone, 71.3 per cent of station wagons, 63.7 per cent of Custom Royals and 61.4 per cent of Coronets.

New Harvester Giant

International Harvester has announced a new Diesel tractor designed to pull two 40 ft trailers on long-distance toll road hauls. The 160 in. wheelbase COE unit has a 335 hp Cummins diesel, as standard equipment, or a Harvester 375 hp diesel as optional equipment.

Kelsey-Hayes Expands

Kelsey-Hayes Co. has purchased the idle Romulus (Mich.) Navy jet engine plant for expanded automotive parts production. The company's bid of $2,260,000 for the never-used $50 million plant was accepted by the General Services Administration.

No immediate plans for use of the sprawling plant were announced, but a Kelsey-Hayes official said the production would be "almost entirely automotive." A realignment of the company's present Detroit plants probably is in order, since no new products are planned for the Romulus plant.

The plant was built by Ford Motor Co.'s Lincoln-Mercury Div. during the Korean war for production of J-40 jet engines for the Navy. The engine contract was cancelled before the plant was completed.

The plant, 25 miles west of Detroit, covers 157 acres and includes 13 buildings with nearly one million sq ft of floor space. Kelsey-Hayes is expected to utilize all of the facilities. The plant was designed to employ from 2000 to 5000.

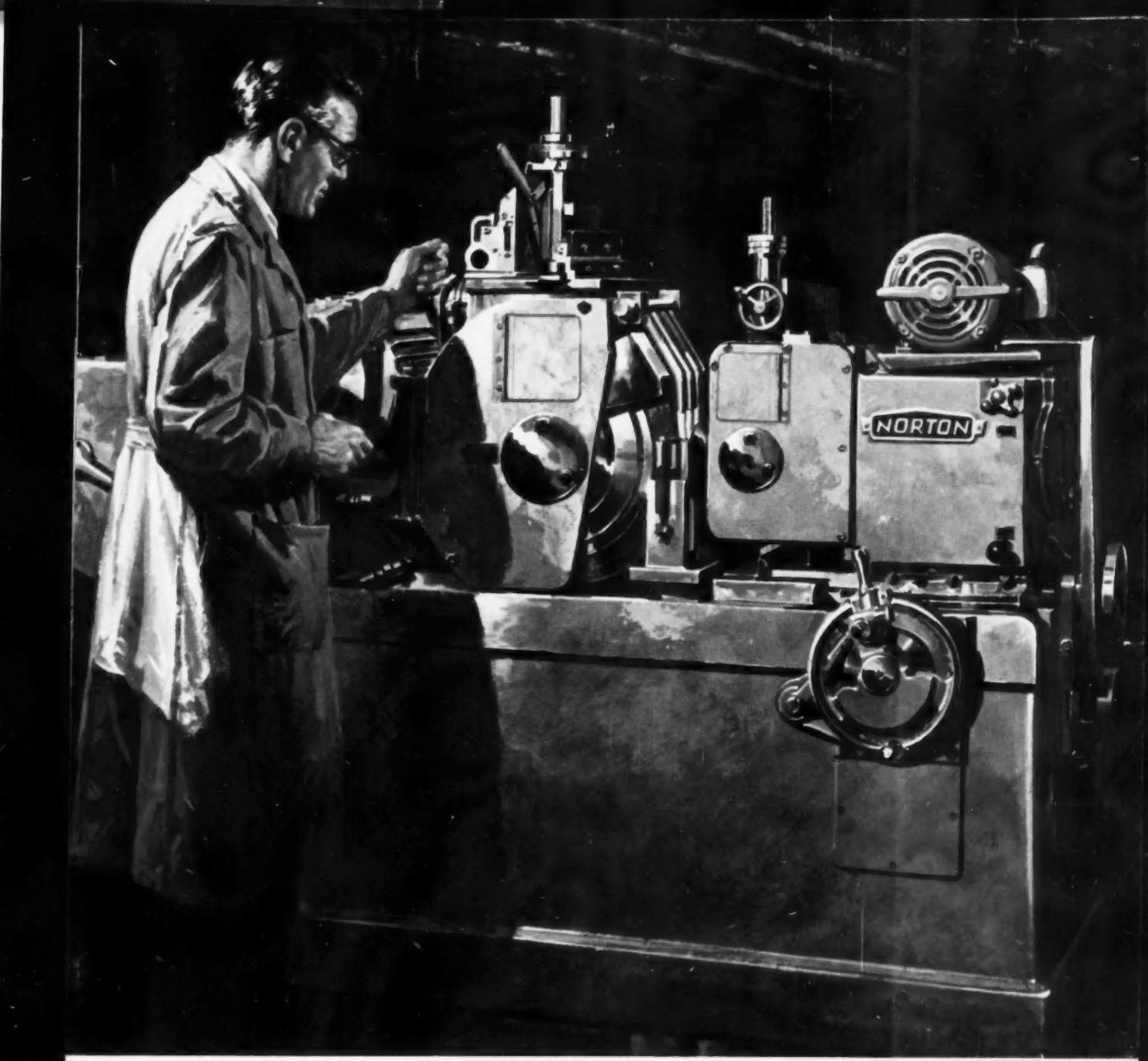
In other plant news, Young Spring and Wire Corp. of Detroit expects to open a new automotive parts plant in Mt. Olive, Ill., in November. This plant will employ some 200 persons.

Buying Plans Cited

Consumers are in a car-buying mood, according to the latest University of Michigan Survey Research Center study. Plans for buying automobiles are as high as, or higher than, they were in 1954 and 1955 May-June study periods. This, of course, signals a sharp upturn from the 1958 intentions.

U of M interviewers found that the growing demand for second cars is an important source of strength in the automobile market. But it also noted that plans for buying used cars are well ahead of plans for new car purchases, and have never been higher than now. This latter finding might shed some light on the question of what will happen to the used car market after the Big Three announce their small cars in the Fall.

Circle 116 on Inquiry Card for more data



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Your own records will show ISOBRITE Brighteners give longest possible life in rack or barrel plating operations.

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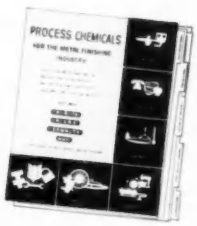

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NEWS

FEATURES

All-Aluminum Amphibian

A new all-aluminum amphibious craft has been delivered to the Army by the Ingersoll Kalamazoo Div. of Borg-Warner Corp.

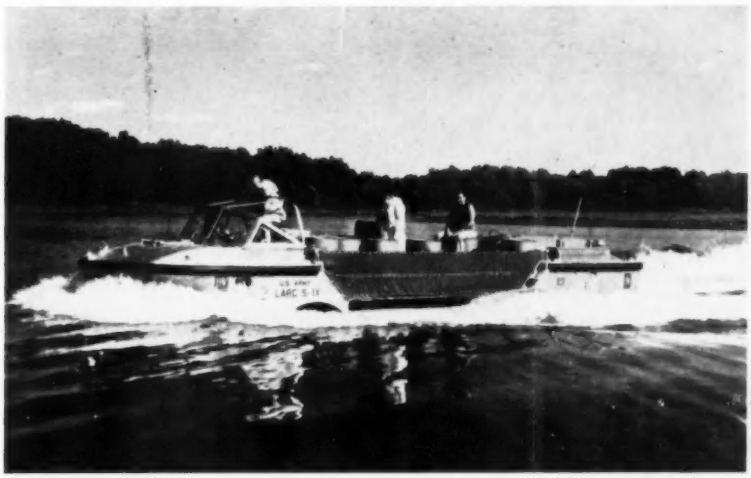
The new craft, called LARC-5, has more speed, mobility, maneuverability, and water-borne stability than any of its type ever built, says R. S. Ingersoll, B-W president.

The LARC is 35 ft long, 9 ft wide. It can haul five tons of cargo at speeds of 10 mph in water and 35 mph on highways.

It is powered by a 270-hp Ford industrial engine which transmits power to all four wheels on land and to a single propeller when the craft is in the water.

The LARC features a unique steering system, which controls both front and rear wheels. This makes possible a "crab steering" action which allows the LARC to veer sharply to the right or left and leave the road in a sidewise fashion.

The lightweight amphibian was built under an Army contract. Reynolds Metals Co. acted as aluminum consultant to the Army and helped advise Ingersoll-Kalamazoo on correct aluminum welding techniques.



The Army's LARC-5, described as the first all-aluminum amphibious craft, will replace the 2½-ton DUKW of World War II fame.

Chevrolet To Build

Chevrolet is planning to add another 850,000 sq ft to its Baltimore car and truck assembly plant, and Fisher Body will add 170,000 sq ft at its nearby body plant. The project, scheduled to get under way next fall, will nearly double the combined Chevrolet - Fisher floor space in Baltimore, bringing it to 2,064,000 sq ft.

Meanwhile, a current project, slated for completion next September, will add 115,000 sq ft to truck assembly operations at Baltimore.

Ford Div. also is planning a new building, this one a 216,000 sq ft parts storage warehouse adjacent to the Louisville assembly plant. The new warehouse, scheduled for completion next March, will be used primarily for truck parts.

Aluminum Engine Block

A patent for a die cast eight-cylinder aluminum engine block for automobiles has been granted to Alfred F. Bauer and assigned to National Lead Co.

Bauer is assistant general manager and chief engineer of the Doehler-Jarvis Div. of National Lead.

The design is applicable to all V-8 engine blocks, according to Doehler-Jarvis. It eliminates undercuts, projections, and blind passages, and allows for efficient mass production of blocks by die casting.

A die-cast aluminum block for an average V-8 engine weighs 55 lb, a saving of more than 150 lb over a similar block in gray iron.

The design covered by the patent takes advantage of the high thermal conductivity of aluminum, to make changes in the water passages, the company said.

AI TABLOID

United States Rubber Co. has licensed Ford Motor Co. to use its Marvibond process — a technique for laminating vinyl plastic sheet to metal. Ford, the first automotive firm to be so licensed, is considering extending the use of vinyl-to-metal laminates to other model lines beside the Thunderbird.

* * *

The Army has developed a tension tester that fractures viscoelastic materials in from 5 to 40 milliseconds. High loading rate is achieved by suddenly releasing compressed gas into a cylindrical chamber to drive a piston attached to one end of the specimen. Longitudinal slots in the cylinder walls permit gas to escape after piston has traveled a short distance, snapping the tensile strain.

* * *

Filters made of platinum or palladium for use in missiles can withstand temperatures above 3000 F, says Baker Platinum Div. of Engelhard Industries, Inc. The filters, consisting of tiny identical spheres of platinum or palladium welded together in pads, may be used to meter the flow of an acid involved in the chemical reaction that propels a missile.

* * *

Minneapolis-Honeywell is using "fingers" of air pressure and vacuums instead of mechanical brakes and clutches to guide the tapes on the Honeywell 800 computer system. The new system reduces tape wear and slippage by distributing braking and clutching forces over areas 10 times as great as those subjected to mechanical pinching, says M-H.

* * *

National Bureau of Standards has developed a modified plasma jet that produces temperatures up to 8000 C for the spectrographic analysis of complex alloys. The device vaporizes a solution of the test specimen, causing it to emit spectra not obtained ordinarily at lower temperatures with chemical flames.

Federal-Mogul-Bower Bearings, Inc., is building a new plant at St. Johns, Mich., to produce copper-lead bearing powders. The new facility, which will double present production capacity, will include special equipment for turning out bearing powders by a water-jet atomizing process.

* * *

Electric Auto-Lite Co. is marketing a special battery designed for deep cycling applications, such as golf carts, supermarket "go-carts" and materials handling equipment. The new battery features a special "Anti-Shed" positive active material that reduces the rate of shedding and loss of power, according to Auto-Lite.

* * *

A new electrolytic hard chrome plating process which will deposit almost instantly a film of corrosion resistant hard chrome plate on the base metal has been announced by Michrom, Inc., a division of Gits Bros. Mfg. Co. The new technique eliminates hydrogen embrittlements and gives a dense, fissure-free bond of alloy-like strength, Michrom says.

* * *

German automobile production for the first half of 1959 is nearly as high as the total output for 1955, says the German-American Chamber of Commerce. It is expected that Germany will manufacture 1.7 million cars this year, of which 850,000 will be exported. Current production is up 12.2 per cent over last year, exports, 17.3 per cent.

* * *

General Motors is planning a $20 million expansion program of its facilities in Buenos Aires, Argentina. The plan calls for expansion of two existing plants and construction of new facilities, including an engine manufacturing plant.

* * *

Oldsmobile reports installation of 50,924 air conditioning units in the model year through June 30, for a rate of 16 per cent. This compares with 36,941 units a year ago.

DOUBLE-DUTY TIRES

Goodyear's "Rolli-Tankers" do double duty as "go-anywhere" tires and liquid containers. Each tire carries 500 gallons and is made of oil and chemical-resistant rubbers. Rolli-Tankers are 64 in. high and 42 in. wide, and each unit is equipped with tow bar, air brakes and pumps. Army has awarded Goodyear an $800,000 contract to build 166 units.

Canadian Jeeps

Willys of Canada has begun assembling Jeeps at a converted plant in Windsor, Ontario. Production began this month (August) at the Willys national vehicle and parts distribution center on Central Avenue, and the company hopes eventually to reach an annual level of 1000 units.

First vehicles being assembled are the CJ-5 Jeep Universal. Later, the plant will assemble CJ-3B and CJ-6 models. Initially, 40 per cent of the components are Canadian manufactured, with other components shipped from the Willys plant in Toledo.

Thus, Willys becomes the sixth vehicle manufacturer to operate in Canada. It joins GM, Ford, Chrysler, Studebaker-Packard and International Harvester.

Willys of Canada will continue to operate its Windsor distribution center. In addition, the company has a branch warehouse in Vancouver, B. C., and 12 distributors and 240 dealers throughout the country.

Aluminum Survey

Aluminum will play a more vital role in defense because of the Armed Forces' need for lightweight, air-transportable equipment, according to a Reynolds Metals Co. survey.

"During 1959, several hundred million pounds of aluminum will go into equipment for national defense, and in the next years this amount will increase substantially," said David P. Reynolds, executive vice-president.

Mr. Reynolds, in making the survey public, said aluminum is now being used for every kind of military equipment—from tent pegs to combat vehicles protected by aluminum armor-plate.

The Reynolds survey showed a minimum of 336 actual or potential applications of aluminum military equipment, distributed as follows: Army, 265 type of equipment; Navy, 54 types; Air Force, 17 types; Marine Corps, similar to Army applications.

Stressing the advantages of aluminum, the survey pointed out that aluminum armor-plate can give equal protection with less weight than comparable steel armor, and that aluminum vehicles need less fuel than conventional vehicles.

Other advantages cited: Aluminum costs less to fabricate because it joins and forms easily, and it requires less maintenance because it is rustproof and resists corrosion.

Renault Joins Debate

Renault of France has joined the current front-engine vs rear-engine debate with some arguments in favor of the rear engine.

Renault reported that wind tunnel tests in France showed that the rear-engine Dauphine has 8 per cent less wind resistance than front-engine cars of comparable size. This is due, Renault said, to lack of a radiator in front which scoops up air when the car is in motion. This was further demonstrated in a test which showed that the wind resistance in a front-engine car is 10 to 40 per cent greater than the drag on the same car with its radiator masked.

Another advantage cited by Renault is that the wind tends to push down on the front end of the car because of its configuration, increasing its stability.

RUSSIAN STATION WAGON HAS FIVE DOORS

The Moskvich-423 station wagon features five-doors, roomy luggage compartment, and seats that can be folded into a convenient bed. Car is powered by a four-cylinder 45-hp engine and is built on a 91.3-in. wheelbase. Overall measurements: 128.6 in. long; 60.6 in. wide; and 63 in. high. Gross weight is 2270 lb.

'Lead-Cemented' Alloys

A promising class of new metallic materials has been demonstrated at Battelle Memorial Institute.

The new materials — "lead-cemented" alloys—are made by mixing molten lead with finely divided solid particles of other metals or materials.

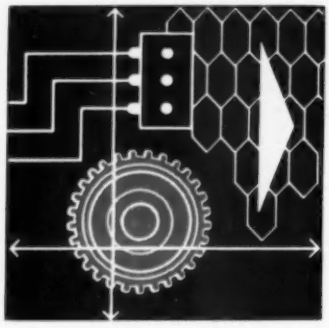
The result, according to Battelle, is a combination of properties that may be useful in many applications. For example, lead is effective against gamma rays but, with boron added it would be an even more effective shielding material, since boron stops neutrons—also a product of radiation.

Other suggested uses would take advantage of lead's corrosion resistance and even of its softness, which can be turned into an asset with the new alloys. The lead could serve as a binder for dispersing in mixtures having less ductile materials, such as tungsten, or with very fine iron powder which has unusual magnetic properties.

Battelle investigators found that at least six metals are ideally suited for the new alloys—cobalt, copper, iron, molybdenum, nickel, and tungsten.

Hertz Buys Small Cars

The Big Three already have received quantity orders for their compact cars. Hertz Corp. has ordered a total of 3000 Corvairs, Falcons and Valiants, may order another 1500 before the end of the year. Total cost of the fleet: more than $10 million.



AVIATION MANUFACTURING

Second, Third Stages Picked for Saturn

The Pentagon's Advanced Research Projects Agency has picked rockets for the second and third stages of the three-stage Project Saturn space vehicle.

The ARPA chose a modified first stage of the Titan ICBM for the second stage of the Saturn and the new Centaur rocket for the third stage.

The huge 200-ft space vehicle, slated to be ready by 1962 or 1963, will boost satellites weighing several tons into orbit.

Saturn's first stage will be a cluster of eight H-1 rocket engines developed by Rocketdyne Div. of North American Aviation, Inc. The cluster will produce about 1.5 million lb at liftoff. The modified-Titan second stage will provide a thrust of 360,000 lb, and the third-stage Centaur using two rocket engines a thrust of 30,000 lb.

Initially, ARPA ordered one first stage booster for static testing and four flight vehicles. It said the first two flight models would use dummy upper stages, while the third and fourth might include the modified Titan second stage. First flight test is slated for late 1960.

ARPA said that Cook Electric Co., Morton Grove, Ill., is developing a special system using parachutes and retro-rockets to recover the first stage booster for study and possible reuse.

Roy Johnson, director of ARPA, said the Saturn vehicle will be an "extremely useful workhorse," able to put up heavy low-altitude satellites, communications satellites, and deep space probes. "We expect that it will also be able to carry a ton of instruments to a soft landing on the Moon," he added.

Unmanned Fire Fighter

Solar Aircraft Co. announced a new guided missile fire fighter that is launched like a rocket and hovers like a helicopter.

The new craft, called the Firefly, can zoom anywhere within 5 miles in 40 seconds. It is fired and guided by push buttons to an air crash or other site of potential fire.

When the unmanned Firefly reaches a crash scene it turns into a helicopter and hovers over the area. The remote operator can flip a switch to dump as much as a ton of extinguishing liquid on a burning airplane.

The Firefly looks like a small jet aircraft with helicopter blades in its tail and a fire nozzle in its nose. A solid propellant rocket under the fuselage shoots the missile into cruise altitude. When in flight, it operates as a fixed wing aircraft, with the three rotor blades locked back to serve as tail surfaces.

An electronic brain picks up commands from a remote operator and translates them into mechanical control of the aircraft's devices. Sensing devices in the vehicle tell the operator how severe a fire is and how much extinguishing fluid to release.

The Firefly, excluding rotors and dispensing nozzle, is about 16 ft long and together with its payload weighs about 5000 lb.

Firestone Gift

Firestone Tire & Rubber Co. has given California Institute of Technology $1,050,000 to build a new aeronautics laboratory.

The new facility will be known as the Firestone Aeronautical Research Laboratory. It will include advanced research equipment such as plasma jets, shock tubes, electric arc wind tunnels, and hypersonic tunnels operating at speeds up to 12,400 mph.

Supersonic Tire Tester

The Air Force has developed a new tire tester that accelerates from zero to 300 mph in 20 seconds and decelerates from 300 mph to zero in 18 seconds.

The new equipment, built by Adamson United Co., Akron, O., will be used to study experimental tires for supersonic aircraft.

The new testing facility simulates takeoff or landing conditions of any supersonic aircraft. At the machine's core is a 120-in. flywheel that rotates up to 900 rpm, simulating a ground roll of 300 mph. An automatic preset programmer applies precise speeds and loads to duplicate the condition of any high-speed jet rolling down the runway.

Dual carriages accommodate fighter or bomber type tires on each side of the flywheel. One carriage is built to take a maximum load of 60,000 lb, the other up to 25,000 lb.

The carriages swivel in two directions to apply camber effects (up to 15 deg) and yaw effects (up to 20 deg). Combinations of the two effects can be used to produce tread scrubbing and carcass stresses, which result from undercarriage movement, cross wind, or turning loads.

Canada to Build Jets

Canadian manufacturers have been tabbed for contracts totaling more than $400 million to build F-104E jet fighters for NATO forces. Orenda Engines Ltd. of Malton, Ont., which developed the powerful Iroquois jet, will build the GE J-79 engine for the plane under a contract of approximately $92 million.

Airframe contracts were not let immediately, but probably will go to A. V. Roe Canada Ltd., De Havilland Aircraft of Canada, Ltd. or Canadair, Ltd. The contract, which will total about $164 million, may be split. Instrumentation, fire control and other contracts have not been released.

Announcement of the order brought criticism from Canada's Liberal party, which doesn't approve of the Lockheed plane.

GE Furnace

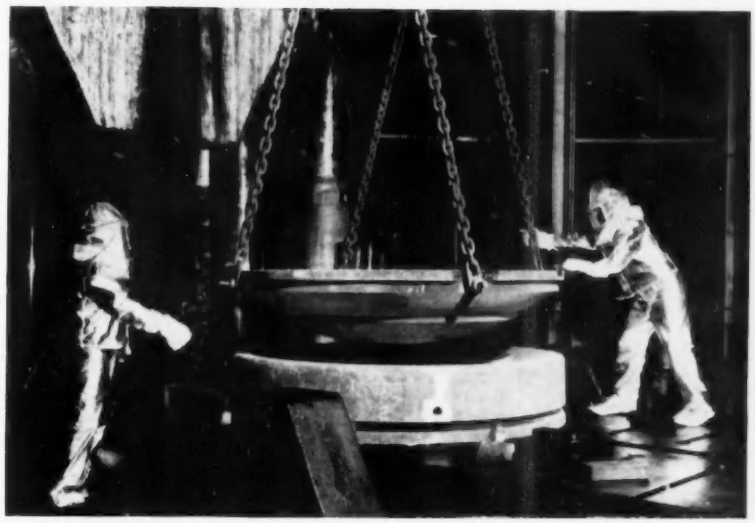
General Electric has started work on a new furnace that will heat treat rocket cases up to 30 ft long and 10 ft in diameter.

The furnace system will consist of a high-heat hardening furnace (up to 2000 F) and several 1300 F furnaces.

After fabrication, GE said, the rocket case will be lowered into one of the pit furnaces and heated to 900 F. The high-heat furnace then will be rolled around on its tracks directly over the pre-heated case, which will be lifted into the furnace by a chain hoist.

As the case is brought to the right temperature, the high-heat furnace moves to a position directly over a quench station, and the case is lowered into the pit and then cooled.

The furnace will be built by GE's Industrial Heating Dept. It is slated for operation by March, 1960, at the company's Flight Propulsion Laboratory Dept.



Workers in aluminized suits prepare dies used for forging beryllium discs at Alcoa plant in Cleveland

Manned Capsule to Have Beryllium Shield

A huge heat-absorbing shield made of beryllium will form part of America's first space capsule that will carry a man in orbit around the world.

The shield was forged by Aluminum Co. of America from a beryllium billet made by Brush Beryllium Co. It is one of a series of beryllium forgings Brush and Alcoa will produce for the manned capsule in the National Aeronautics and Space Administration's Project Mercury.

The beryllium billet was made by Brush's patented QMV process, which applies vacuum, heat and pressure to beryllium powder. It then was shipped to Alcoa's Cleveland works, where it was squeezed in a 50,000-ton press into a saucer-shaped disc, 80 in. across and 3 in. thick.

The forged part will be returned to Brush for precision finishing. After ultrasonic inspection by Alcoa, it will be shipped to McDonnell Aircraft Corp., the prime contractor for the Project Mercury capsule.

During the rocket ride—from a launching pad to outer space—the beryllium part will form the outside covering of the "floor" of the space capsule. On the return to earth, the shield will be the chamber's leading face. As it descends, the light and tough beryllium shield will store and dissipate tremendous heat—generated by the capsule while traveling through the atmosphere at 18,000 mph.

Hydrostatic Testing

The fuselage of a Convair 880 has been submerged in a hydrostatic test tank for six-months of pressure testing.

W. W. Fox, chief engineer for Convair-San Diego, said the hydrostatic tests of the structure under internal pressure will "insure that the airplane performs satisfactorily even after 20 years or more of flying."

In the hydrostatic test tank, loads like those experienced in flight are applied. Whiffletrees linked to metal straps attached to the fuselage are operated by hydraulic rams.

By applying a combination of pressure and loads to the fuselage, the test simulates taxi operations, flight in rough air, descent, and landing—all in a one-minute period. This cycle is repeated 50,000 times, simulating 880 flights.

MEN IN THE NEWS

Ford Motor Co. — G. J. Lynch was elected a vice-president.

Air Reduction Sales Co.—E. S. Twining, Jr., was appointed vice-president, marketing.

Enjay Co. — R. K. Dix was elected a vice-president.

Budd Co. — D. D. Robertson was named vice - president in charge of automotive engineering.

Chrysler Corp. — F. J. Suslavich was made assistant director of the corporate sales staff.

Timken Roller Bearing Co.—R. K. McConkey was promoted to general manager of the Industrial Div., and A. E. Matejka to chief product engineer in the Engineering Div.

ACF Industries, Carter Carburetor Div.—**V. F. Thompson** was appointed service sales manager.

Vickers Inc., Aero Hydraulics Div. —**R. P. Lambeck** was made engineering manager-major programs.

Oakite Products, Inc.—**B. P. Fortin** has been transferred to Los Angeles and **J. G. Hickey** to Sacramento, Calif.

Electric Auto Lite Co.—**L. C. Vogt** was named Michigan district manager of the Electrical Products Group.

General Motors Corp., Research Laboratories—**M. D. Cooper** was made head of the Chemistry Dept., and **Dr. P. Weiss** head of the newly created Polymers Dept.

Yale & Towne Mfg. Co.— **J. H. Eddy** has been named director of executive development and **F. P. Minnelli** director of planning.

Minneapolis-Honeywell Regulator Co.—**K. C. Cummings** has become engineering manager of the Beltsville, Md., division.

Dow Chemical International Ltd., S.A.—**M. Key** was appointed operations vice-president, and **A. M. Griswold** and **E. K. Stilbert** were named product group vice-presidents.

B. F. Goodrich Tire Co.—**J. N. Brewster** is now manager of petroleum company sales.

Ford Div., Ford Motor Co.—**H. A. Pries** has become truck sales promotion and training manager.

Mack Truck, Inc.—**G. F. Jones** was named general manager — Eastern Div.

Jones & Laughlin Steel Corp.— **H. E. Robinson** was made director of production planning programs, and **W. L. Cressman** succeeds him as director of product divisions.

Walker Mfg. Co.—**P. J. Collingsworth** was named Memphis district manager.

Pines Engineering Co.—**G. Beckwell** is now head of research and development.

Joseph T. Ryerson & Son, Inc.— **E. D. Verkerk** was made head of the aluminum sales department.

Dow Corning Corp., Silicone Specialties Div.—**F. R. Matthews** was named manager.

U. S. Rubber Co., Tire Div.—**C. J. Benner** is now chief engineer of the automotive sales department.

Bendix Aviation Corp.—**T. Tognola** was named an assistant director of engineering for the Scintilla Div.; and **E. E. Evans** and **R. J. Quirk** were appointed general manager and assistant general manager, respectively, of the Kansas City Div.

Borg-Warner Corp.—**S. J. Becker** was made vice-president and chief engineer of the Spring Div., and **P. A. Heber** sales manager, truck refrigeration, for the York Div.

Eaton Mfg. Co.—**R. A. Wieland** was appointed assistant plant manager of the Marion Forge Div.

Eaton Mfg. Co., Axle Div.—**R. E. Wilbert** was promoted to chief industrial engineer.

Necrology

Henry W. Nuckols, 90, once president of Columbia Motor Co., a pioneer manufacturer of electric automobiles, died July 16, at Greenwich, Conn.

George C. Neilson, 40, president of Neilson Wheel Co., died July 11, at Oconomowoc, Wis.

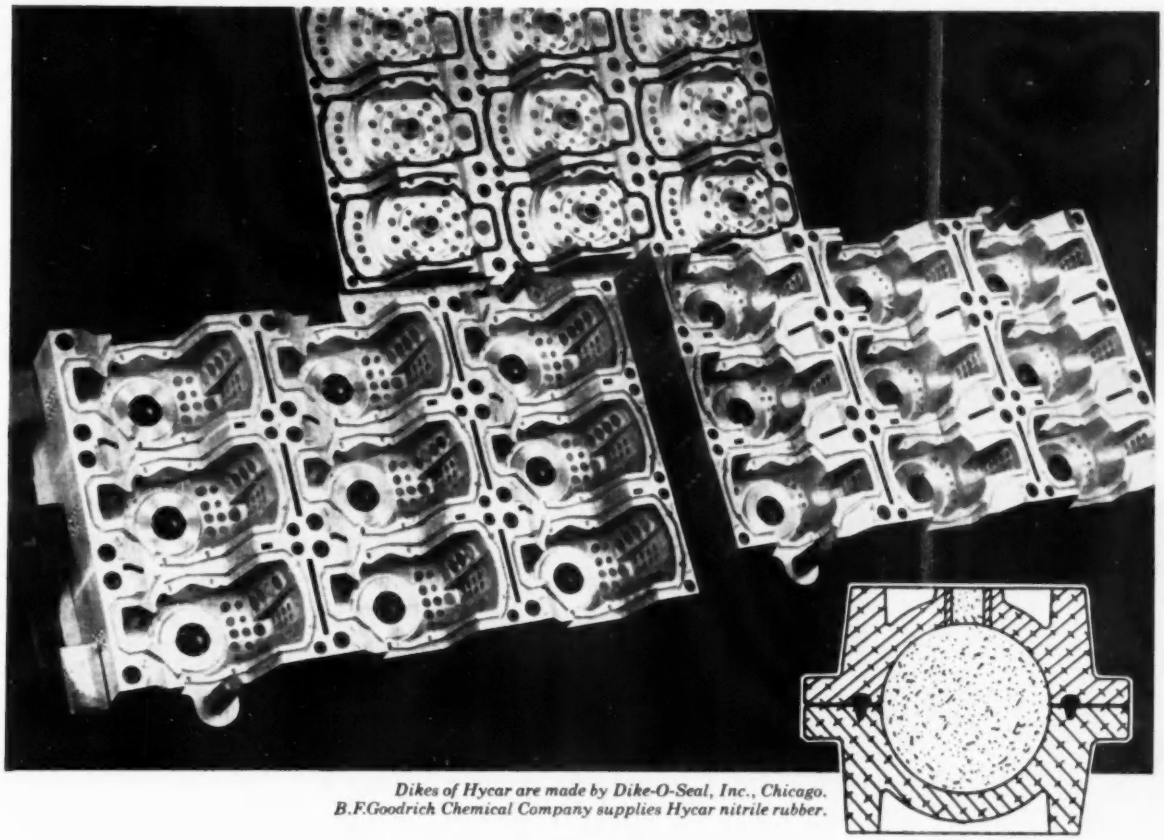
Val C. Hart, 58, field sales engineer for Bullard Co., died June 30, at Fairfield, Conn.

Ronald T. Riley, president of Canadian Pratt & Whitney Co. Ltd., died recently, at Montreal, Que.

Lee Doty, 48, vice-president—engineering and research for Wausau Motor Parts Co. died recently.

Another new development using

B.F.Goodrich Chemical *raw materials*



Dikes of Hycar are made by Dike-O-Seal, Inc., Chicago. B.F.Goodrich Chemical Company supplies Hycar nitrile rubber.

Hycar seals go to core of pressing foundry problem

Modern foundry practice calls for cutting costs by blowing sand into core boxes under pressure. The result is a better core and eventually a better casting—but there are problems. Without a perfect seal, operators get a condition called "blow-by", an erosion of core boxes that may result in flaws in the finished casting—as well as damaging the box itself.

The problem is being solved with flexible Dikes made from Hycar nitrile rubber. These Dikes provide a perfect seal under some tough operating conditions. The Dikes have to be flexible to fit the outlines of complicated core box parting faces. And they stay in place during core box cleaning, exposing them to live steam, alkali or even fuel oil.

Since Hycar retains its resilience under a wide range of temperature and the most severe mechanical deformation, it proved ideal. In addition, it has unusual abrasion resistance and can withstand hydrocarbons and chemicals that destroy ordinary rubber. Hycar may be the material that can help you get more results for your product. For information, write Dept. CK-3, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar

Rubber and Latex

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich GEON polyvinyl materials • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

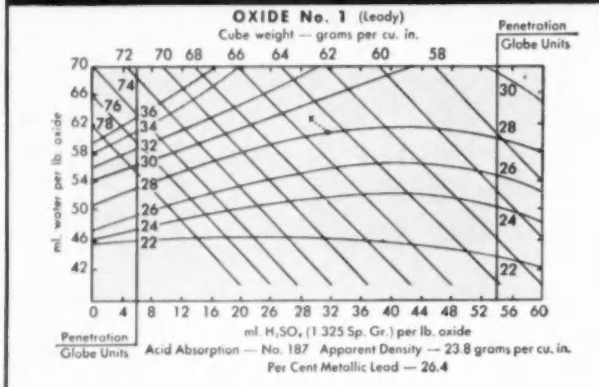
Circle 120 on Inquiry Card for more data

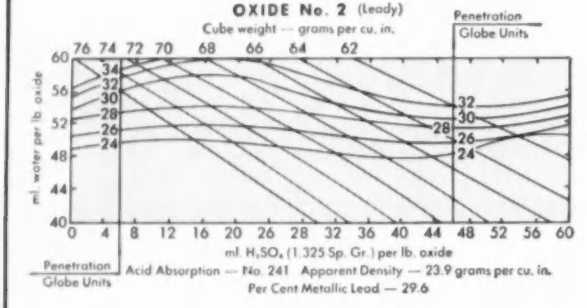
to GLOBE RESEARCH no battery is ever perfect

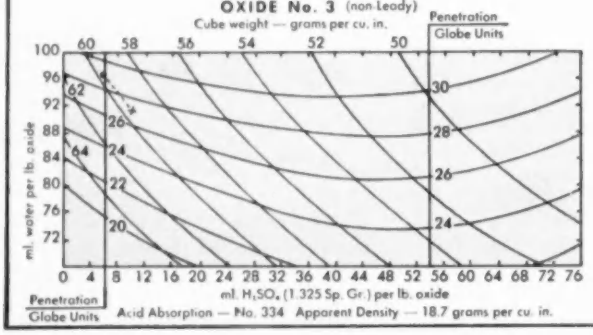
from Globe Research

laboratory control of paste mixing at the production point for top battery quality

Typical mixing curves for different oxides


OXIDE No. 1 (Leady)
Cube weight — grams per cu. in.
Penetration
Globe Units
ml. water per lb. oxide
ml. H_2SO_4 (1.325 Sp. Gr.) per lb. oxide
Acid Absorption — No. 187 Apparent Density — 23.8 grams per cu. in.
Per Cent Metallic Lead — 26.4


OXIDE No. 2 (Leady)
Cube weight — grams per cu. in.
Penetration
Globe Units
ml. water per lb. oxide
ml. H_2SO_4 (1.325 Sp. Gr.) per lb. oxide
Acid Absorption — No. 241 Apparent Density — 23.9 grams per cu. in.
Per Cent Metallic Lead — 29.6


OXIDE No. 3 (non-Leady)
Cube weight — grams per cu. in.
Penetration
Globe Units
ml. water per lb. oxide
ml. H_2SO_4 (1.325 Sp. Gr.) per lb. oxide
Acid Absorption — No. 334 Apparent Density — 18.7 grams per cu. in.

In the manufacture of lead-acid storage batteries in a multi-plant operation, the control of the oxide paste mixing is essential. Through laboratory work, specific curves for cube weight and plasticity (penetration) vs. the mixing proportions of acid and water have been developed for each oxide used.

Thus, by controlling the water and acid, plasticity and cube weight can be determined for any oxide used at any of Globe's battery plants.

Globe research continues to develop means for production control. Work in progress relating to pastes and oxides involves the study of particle size, re-activity in sulphuric acid and the rate of reaction in sulphuric acid of various oxide blends. These studies will lead to closer control of conditions to produce pastes with invarient properties.

For more information write for Bulletin, entitled: "Lead-acid battery pastes compositions and characteristics."

For original equipment or replacement, Globe Spinning Power Batteries are readily available from 16 strategically located plants.

SPINNING POWER
GLOBE-UNION
SPLIT-SECOND STARTING

GLOBE-UNION INC.

MILWAUKEE 1, WISCONSIN

If it's Petroleum-powered there's a GLOBE-BUILT BATTERY right from the start!

Circle 121 on Inquiry Card for more data

Use Skinner automotive solenoid valves for safety and automatic control

More and more Skinner solenoid valves are being used to provide automatic operation in the control of cylinders, cams, clutches, etc. on buses, passenger cars, trucks, farm and road machinery for convenience, speed and safety.

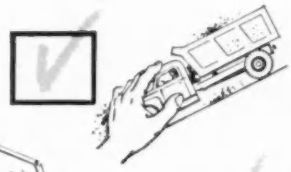
Here is a partial list of applications for Skinner solenoid valves.

Control of clutch in dual transmissions for automatic shifting from one to another.

Control of tailgate to automatically adjust to height of platform.

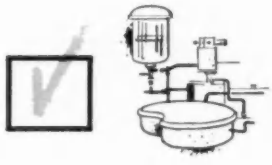
Control of brake in conjunction with tailgate — automatically sets brake when tailgate touches platform.

Control of fan clutch—to disengage fan from engine at predetermined RPM—increases usable horsepower.



Braking control—to provide constant pressure on brake when truck is traveling on grades.

Control of lift systems, lift trucks, stabilizing equipment, leveling, door opening and closing.



Fuel cut-off and control—diesel, propane, butane—gasoline fuel injection—saddle tanks—refrigeration equipment.

Skinner solenoid valves are manufactured to UL standards. They are bubbletight, easy to mount, and are available in a variety of diameter sizes from 3/64″ to 1″ and in pressure ratings up to 3000 psi.

Skinner solenoid valves are available with single or double automotive terminals; especially designed automotive housings with potted coils (coil, housing leads and flux plate are potted with a compound to make them vibration-proof and moisture resistant); and waterproof molded coils that operate in all types of weather, under the severest conditions—even under water.

And many, many other applications are being developed by alert automotive engineers every day.

Skinner solenoid valves are distributed nationally.

For complete information, contact a Skinner Representative listed in the Yellow Pages or write us at Dept. 338.

SKINNER ELECTRIC VALVES®

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an Editorial

Management Men At Work

THE CRISIS IN THE steel industry brings into sharp focus the vital role of management functions in the automotive industries. Despite the steel shut-down, production operations will continue in the more than 6000 plants of these vast industries which consume huge quantities of iron and steel. This continuity of production is possible because top management executives, engineers and production managers in the automotive industry plants, planned wisely for the practical problems which a steel strike might present.

This problem was not a simple situation. It involved evaluation of factors which were so complex as to require the highest level of responsibility and the utmost of insight, to formulate sound decisions. Typical factors of great importance included the rising rates of automotive production which have moved steadily ahead of 1958 records. Another factor was the need for sound policy statements to ward off the dangers of promoting speculative and unsound advance buying of automotive products based on scare forecasts of shortages of supply. Another factor was the need for correct evaluation and adjustment of total tonnage requirements based upon estimates of needs for both new model production, plus the compact car production. A further factor was the need to locate and use storage and warehouse space for carrying inventories of stockpile purchases of raw materials needed to maintain production in event of a steel strike.

Taken together, these comprised a most intricate pattern of analytical requirements. The importance of such evaluations was amply foreseen by the automotive industries and purchases were adjusted so that production could be maintained despite a shut-down in steel.

From a technical standpoint, this continuity of production demonstrates most vividly the real importance of the executive functions performed by management in the automotive industries. The long range, as well as the short term requirements of production were seen clearly and decisive actions were taken without disturbing the regular ferrous metals market situations. Decisions of this type can not, under any conditions, be shunted off to other persons for proper operating orders. The example of continuity of production under present conditions proves that when management accepts and performs these duties, it creates and shares the benefits of its work most widely—to customers, to employes, to Government, to trade and also to automotive industry plant cities.

It would be difficult to find a precedent in the economic history of this country for such a dramatic and significant demonstration of the unique effectiveness of management activities which could compare with the example presented by the automotive industries in this crisis. The broader significance of this example is that it shows that the total capabilities of management in the automotive industry are far larger than America has ever appreciated fully. This capacity of automotive industrial management, even more than the capacity of the tools and machines of the industries, is one of America's greatest natural resources.

Horton W Barclay

Editor

KNOW YOUR ALLOY STEELS . . .

This is the second of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Effects of Elements Used in Alloy Steels

To simplify a rather complex subject, let's outline some of the individual effects of four leading alloying elements used in alloy steels:

Nickel—One of the fundamental alloying elements, nickel provides such properties as deep hardening, improved toughness at low temperatures, low distortion in quenching certain types of tool steels, good resistance to corrosion when used in conjunction with chromium in stainless grades, and ready response to economical methods of heat-treating.

Chromium—This element is used extensively to increase the corrosion-resistance of steel. It also improves the surface resistance to abrasion and wear. It exerts a toughening effect and increases the hardenability.

Molybdenum—This element exerts a strong effect on the hardenability and toughness of steel. It greatly increases short-time and long-time strength at high temperatures.

Vanadium—An element used to refine the grain and enhance the mechanical properties of steel.

A combination of two or more of the above alloying elements usually imparts some of the characteristic properties of each. For example, chromium-nickel grades of steel develop good hardening properties with excellent ductility. And chromium-molybdenum steels develop excellent hardenability with satisfactory ductility and a certain amount of heat-resistance. In other words, the total effect of a combination of alloying elements is usually greater than the sum of their individual effects. This interrelation must be taken into account whenever a change in a specified analysis is evaluated.

Bethlehem metallurgists can be of considerable help to you in selecting the proper alloy steel for any use. These men will gladly give unbiased advice on alloy steel analysis, heat-treatment, machinability, and expected results. Feel free to call upon them at any time.

And please remember, too, that Bethlehem manufactures all AISI standard alloy steels, as well as special-analysis steels and the full range of carbon grades. You can rely upon their quality, always.

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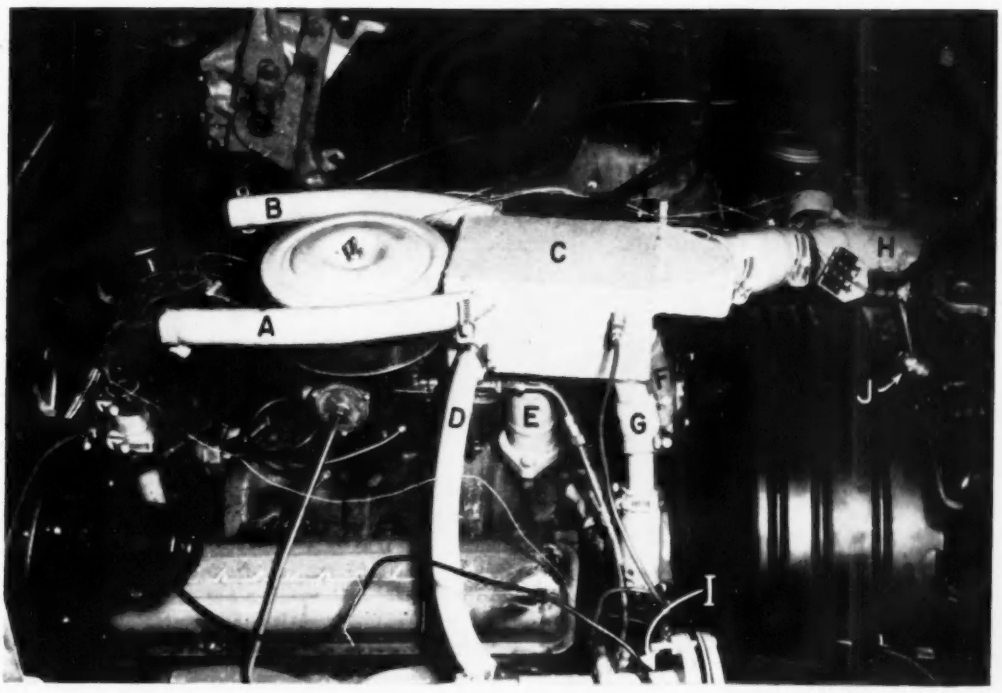
CHEMICALS *and* CARS—
Partners in Progress

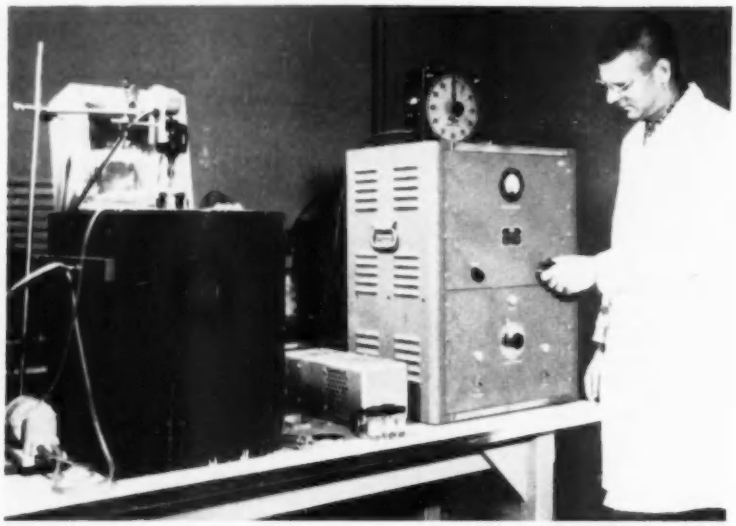
By
Andrew W. Shearer
MARKET RESEARCH EDITOR

Automotive Chemical Research Underway at Dow Chemical Co. Promises Solutions to Tough Vehicle Engineering Problems.

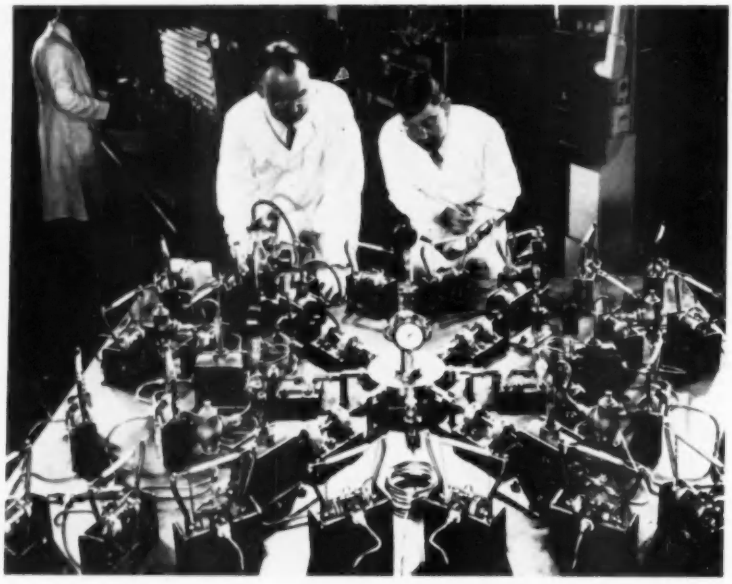
TODAY, as never before, the automotive engineer is faced with a serious two-pronged challenge. He is under pressure to design cars with lower silhouettes and lighter weights. At the same time, he is asked to endow them with performance characteristics undreamed of just a few years ago. How can he do it? With 12-in wheels, the gas turbine engine, the transaxle, ebullient cooling, or even



EBULLIENT cooling system is shown installed for test purposes on 1958 Chevrolet with a V-8 engine. The vapor and entrained liquid escape from the block through outlets (A, B, and E) into separator (C), where vapor and liquid are separated. The vapor exits from the top of the separator through vapor line (H) into top of radiator. Vapor is condensed as it passes down through the radiator and is returned by a condensate pump (mounted under radiator) to the separator through return line (D). Liquid in separator is then carried back to block through lines (F) and (G). Surge tank (I) provides storage space for the liquid that is displaced when vapor is present. Air vent (J) bleeds air from radiator on start-up.



Sonic oscillator provides a simple and rapid laboratory method for determining the shear stability of chemical polymers employed in automotive lubricants to improve flow properties of the oil over a wide temperature range.



Shown here is a stroking machine built to test brake fluids under simulated operating conditions on a mass basis. The large cam in the center actuates six complete hydraulic brake assemblies.

with the free piston engine?

Whatever the answers to this and other baffling problems, specialized chemicals and fluids will play a vital role in making them work. Much of the automotive progress in the past can be attributed to advances in chemical engineering. The intensive automotive chemical research being conducted at The Dow Chemical Co. is an example of how the future as well is being determined in the laboratory.

By "living" with the automobile industry and its engineering requirements for chemicals over a period of years, Dow has developed an intimate familiarity with its problems. The company's history as a leading supplier of automotive chemicals dates back to the 1930's when it first began to make ethylene glycol for antifreeze. Incidentally, largely through Dow's efforts, permanent type antifreeze is now standard for "factory fill" in passenger cars.

From this humble beginning, Dow activities in the automotive chemicals field have expanded to the point where it now supplies carload quantities of chemicals for hydraulic fluids, oil additives, brake fluids, synthetic lubricants, solvents, etc. The company's role is not, however, by any means limited to that of a mere producer. Dow maintains a continuing research and development program concerned with automotive applications of chemicals from the radiator to the differential.

Focal point for information from all other Dow departments engaged in the development or production of chemicals which serve the automobile industry is the Automotive Chemicals Laboratory of the Technical Service & Development Department. The writer was recently privileged to tour the ultra-modern facilities of this laboratory. Summarized below are highlights of work observed in progress on selected chemical problems of vital importance in the car of today and tomorrow:

Ebullient Cooling

There has been in recent months a strong revival of interest among automotive engineers in ebullient or vapor-phase cooling. The word "revival" is used because the method was first studied for potential automotive applications in the 1920's. However, it was discarded as impractical at the time for lack of adequate pressure caps and special coolants required for efficient operation of the system.

Stated in simple terms, an ebullient cooling system boils the coolant out of the engine, converting the liquid into a vapor which goes into the radiator. It is then condensed to fluid and returned to the engine. No thermostat is required because the coolant won't start circulating until it begins to boil. Furthermore, the development of "thermal circulation" eliminates any real

By forcing fluids through precision, sharp-edged orifices under high pressure, this pump-orifice shear unit accurately simulates shearing forces found in the automobile. Shear-stable polymers are essential for modern automotive transmission fluids.

need for the customary water pump.

In the ebullient system, the coolant flow rate through the radiator is reduced 95 per cent as compared to the conventional system. This is due to the fact that the ebullient cooling system utilizes the heat of vaporization for cooling rather than the sensible heat of the coolant. For example, one pound of water will remove 970 Btu's from an engine in an ebullient cooling system, while in a conventional system one pound of water will remove 10 Btu's, assuming a 10 F temperature rise in the coolant passing through the engine.

Ebullient cooling has been used for some time in stationary engines and compressors. The system is now being given a strong push by Dow for vehicle use, particularly in the heavy-duty field. Although the company does not view the system as offering immediate possibilities in passenger cars, it does feel that a definite potential exists there. Proof of this lies in the fact that Dow has been running an extensive series of tests on an ebullient cooling system installed in a 1958 Chevrolet V-8.

The test car is equipped with both ebullient and conventional cooling systems so that comparisons can be made under the same road conditions. Provisions are made for switching from one system to another. Equipment required for the ebullient system includes a vapor-liquid separator, extra coolant outlets in the block, a condensate return line from radiator to separator, a liquid inlet from separator to block, a radiator air vent, and a condensate return pump; this pump could be eliminated if the radiator were installed on top of the engine.

Also needed for successful operation of an ebullient cooling system is a coolant that will have the same vapor concentration as liquid concentration to provide radiator freezing protection. Ethylene glycol and methanol are not suited for the system. Dow is, therefore, using for this purpose its research material ET-373; it has characteristics similar to Dowtherm 209, a coolant used in stationary engine ebullient cooling systems.

Test results to date indicate that many of the known advantages of ebullient cooling can be transferred to automotive vehicles. The use of boiling temperatures, for example, eliminates water, sludge, and acids in the crankcase. A uniform coolant temperature throughout the block with less distortion of cylinder walls results in less flexing of piston rings and longer ring life.

Engine corrosion is reduced because the boiling coolant purges oxygen from the system. The use of 30 to 40 per cent less coolant than in a conventional cooling system is likely, and a five to 10 per cent reduction in radiator size is possible. There is no evidence as yet that the higher operating temperatures of the ebullient system affect the engine adversely.

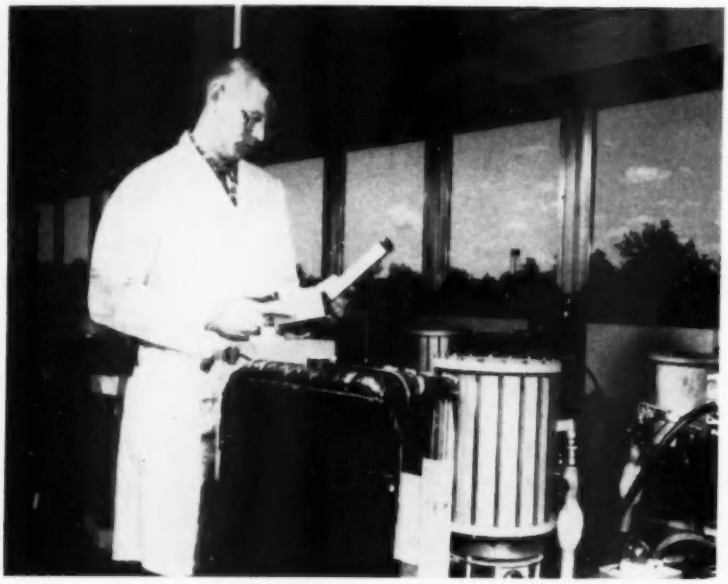
Looking to the future, ebullient cooling may prove to be the route to a completely closed cooling system. Dow's next step in its research efforts, however, will be to cooperate with truck and heavy vehicle producers to install ebullient cooling in their vehicles for testing under field conditions.

Synthetic Lubricants

Dow has been producing polyglycol type synthetic lubricants for many years. Applications for such lubricants range from brake fluid and fire-resistant hydraulic fluid components to compressor lubricants. These lubricants could be used in automobile crankcases, but their cost precludes this application at the moment. However, they offer a distinct potential for use in automotive central hydraulic systems and in gas turbine engines.

Lubrication properties of polyglycol lubricants are equivalent to mineral oils. Some typical advantages of the synthetics are better viscosity-temperature characteristics as well as shear stability, and less carbon and sludge formation during extremes of operation. Synthetic lubricants can be made to be either water-soluble or water-insoluble.

Dow research in synthetic lubricants is continuing at a rapid pace. The most recent advance has been the production on a pilot basis of polyphenyl ethers, a new class of high temperature, radiation resistant lubricants and hydraulic fluids. Some of these can be used at 1000 F for limited periods, and their radiation resistance offers a decided advantage for use in nuclear-powered aircraft of the future.



Corrosion test to determine the effects of the use of an antifreeze in an aluminum engine is in progress here. A standard automobile radiator and water pump and an aluminum test chamber are used to represent a future all-aluminum engine block. Antifreeze solutions are circulated through this equipment to simulate thousands of miles of driving, and the corrosion on the cooling system is measured. Technician is shown checking the operating temperature of the antifreeze.

Brake Fluids

In addition to being a leading producer of chemicals for such brake fluid components as lubricants, solvent - couplers, modifiers, and oxidizers for the inhibitor system, Dow has developed and is marketing two heavy-duty brake fluid formulations that meet SAE specifications 70R3 and 70R1. The company conducts in its Automotive Chemicals Laboratory an extensive test program on all types of brake fluids. Main objective is to develop new and better fluids with higher initial boiling points and improved lubricating qualities.

Already, this intensive research program to meet the ever more punishing demands put on braking systems in the modern passenger car has resulted in the development of fluids with boiling points of over 550 F.

Metal Cutting Fluids

Dow's developmental activity in the area of metal cutting fluids has been centered on efforts to produce improved synthetic lubricants based on polyalkylene oxide chemicals. This course appears to offer the greatest promise for overcoming such drawbacks of some present-day lubricants used in metal cutting operations as inadequate fire resistance, poor heat transfer characteristics, and inadequate lubricity.

Water solubility is a desired property in metal working lubricants to dissipate heat and lower costs. Excellent lubricity is also essential in metal working operations to minimize tool wear, retard frictional heat, and obtain good surface finishes. Unfortunately, although good coolants and good lubricants have been individually available, cutting fluids combining both of these important properties have been relatively few and far between.

However, through the use of specific "custom synthesized" lubricants, it becomes possible to incorporate both water solubility and good lubricity into the same molecular structure. In its quest for and development of such ideal lubricants, Dow uses a maze of various screening tools. These include a host of specialized equipments and test facilities for product evaluation.

VI Improvers

The automobile industry represents an annual market for some 110 million lb ($30 million worth) of viscosity index improvers, primarily for multi-grade motor oils and improved automatic transmission fluids. When a VI improver is added to oil, the viscosity of the lubricant is more stable under widely varying temperature conditions. The high temperatures of engine operation do not thin out the VI improved oil as much as oil without a polymer added. The pour-point depressant effect of the VI improver polymer lowers the temperature at which the oil will "freeze."

Without a pour-point depressant in the motor oil, starting the automobile engine at normal winter temperatures may be difficult or even impossible. The engine cranking speed may be excessively reduced by the extremely thick oil so that the engine starting speed cannot be reached.

Dow research and development laboratories have synthesized and investigated several polymer systems. The two VI improvers which Dow now has in pilot plant production are based on polymethacrylates. The perfection of VI improvers based on other polymers is proceeding at priority speed for use in automotive lubricants of the future.

Antifreeze

Research on cooling systems and cooling system fluids is a continuous project at the Dow Automotive Chemicals Laboratory. Antifreeze formulations are evaluated in glassware corrosion tests, as well as in actual service operational tests, to provide complete data on the effectiveness of various formulations from the viewpoint of both cooling stability and corrosion resistance.

Some cars in the near future may be equipped with aluminum engines. Automotive engineers have predicted that present - day antifreezes, designed for cast iron engines, will not be efficient in inhibiting this metal against cor-

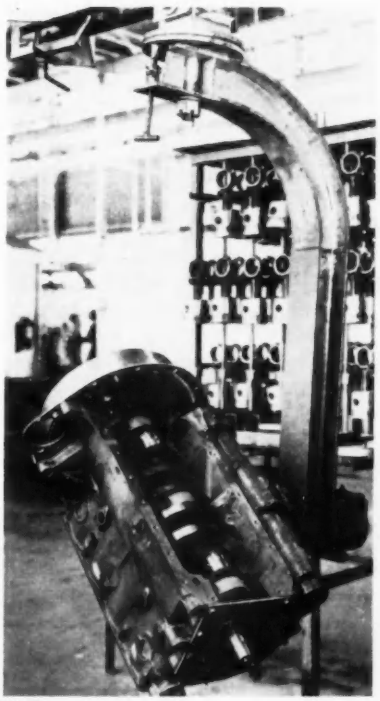
(*Please turn to page* 80)

Deere Installs New Engine Assembly Line

An assembly line for engines, recently put into operation at the John Deere Tractor Works at Dubuque, Ia., embodies a number of features that increase production rate, lessen the manual labor required of assembly line workers, and simplify the floor plan for the line. It was designed and built by the engineering staff and personnel at the Dubuque Works.

The Dubuque Works builds four- and six-cylinder engines of approximately 25 to 80 hp, used on Deere equipment and as separate power units. They are built as gasoline-burning types, Diesels, and for LP gas and natural gas consumption, the last as industrial power units only. To produce this range of types and sizes of engine on a single assembly line requires considerable flexibility in the line layout. It is achieved by using an overhead monorail conveyor, with specially built hangers for holding and carrying the cylinder block, and by locating engine parts in a series of bins along the line of travel of the conveyor.

Of special interest are the hangers themselves. These are of I-beam cross-section to give greatest strength and rigidity, and are attached at the top through a swivel so that the hanger may be rotated vertically, but can be latched in any position. The hanger is curved near the top so that the center of gravity of the engine is practically in line with the attachment point to the monorail, giving the hanger and engine good balance. The engine block is attached to the hanger by a bar that fits into the front motor mount support holes and the flywheel housing attachment holes in the block. A geared head driven by a hand crank permits the block to be rotated vertically, a full 360 degrees. As the entire hanger and block may be rotated on the top swivel, the block can be put in any position while attached to the hanger.



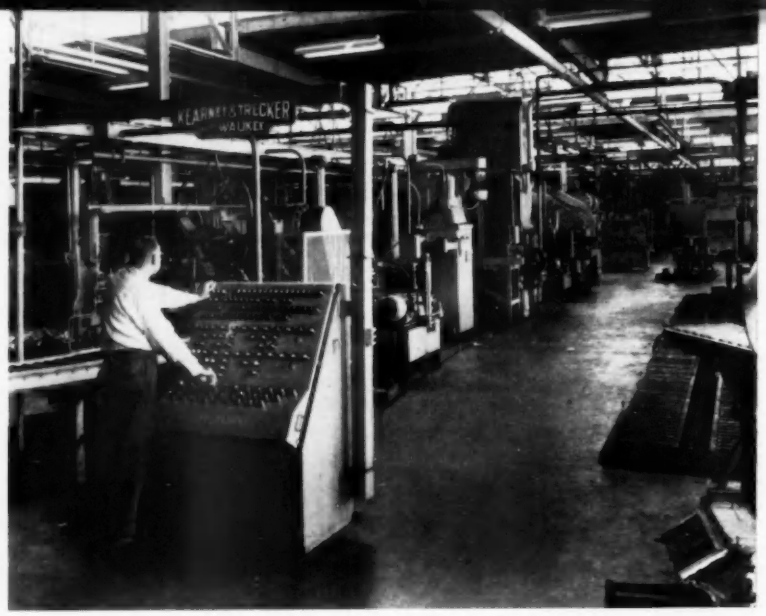
▲ *Close up of the specially-built hanger for carrying cylinder blocks*

◀ *Special hangers carry cylinder blocks through the engine assembly line*

The machined blocks come to the start of the assembly line without bearings, but with bearing caps fastened lightly in place by machine screws. Water jacket, oil line, and cleanout plugs are put in. The block is then attached to the hanger and started down the assembly line. At the first station the block is inverted by the geared head, the bearing caps are removed, and bearings are inserted. Machined crankshafts are brought to the station, and are dipped into an oil bath to insure complete oiling, then are installed in the block. Bearing caps are replaced, using a torquing wrench. As the block moves down the line the cam followers are installed, and the cam shaft is dipped into an oil bath and installed in the block.

At the next station the front cover is installed with its gasket. The ring gear assembly, consisting of flywheel and starter ring gear, and the rear cover, are then assembled to the block. Pistons and connecting rods then installed, the pistons being graded A or B according to size classification. The block has been rotated to an upside-down position for the piston-connecting rod installation, and the oil pan is placed before rotating it back to normal position. The cylinder head and valve assembly is then installed, along with the gasket,

(*Turn to page* 80, *please*)



Perspective of the big 16-station Kearney & Trecker transfer machine on the V-71 cylinder block line.

New Transfer Machining Line *for* Detroit Diesel Cylinder Blocks

By Joseph Geschelin
DETROIT EDITOR

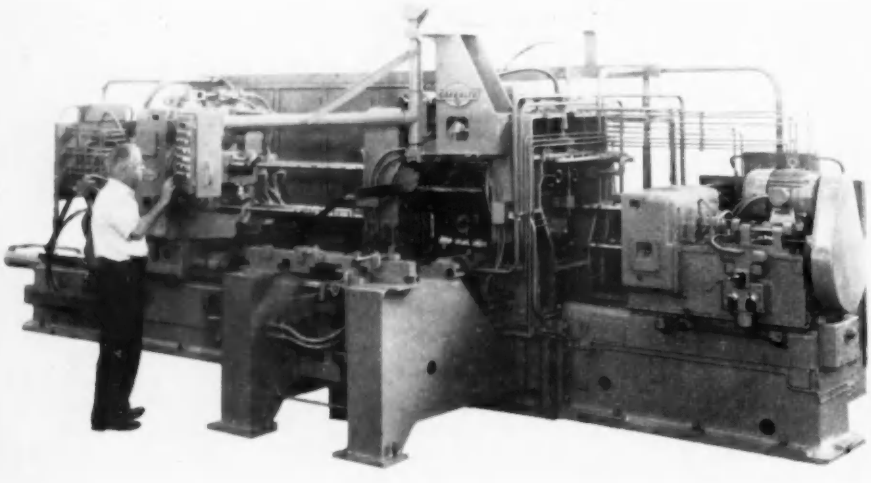
EARLIER this year we published several articles on the major expansion and reorganization of the Detroit Diesel Engine Division plant to accommodate the extensive new line of engines launched late in 1958. The present article records a sampling of the last phase of the program; the new transfer machining line for V-6, V-8, and V-12 cylinder blocks.

The line to be described here is quite outstanding since all of the transfer equipment has been designed to handle each of the three different cylinder blocks by changing some tooling, through the employment of idle heads, and resetting of transfer bars. Such changes are effected quite rapidly through the system of controls incorporated in each transfer machine on this line.

The first operation, starting with the rough casting, takes place in a 16-station Kearney & Trecker transfer milling machine. The sequence of events is as follows:

Station	Operation
1	Load
2	Rough-mill top panrail and bearing cap seats
3	Roll work 90-deg out of fixture
4	Load
5	Finish-mill panrail face
6	Unload
7	Idle and shuttle
8	Drill, chamfer, and ream locating holes; and drill all holes in bearing cap seats.

At this station two holes are drilled 1 1/32-in. diameter, 3.10-in. deep; two holes are reamed 1.0615-



View of Greenlee two-way horizontal boring and reaming machine (taken on the erection floor). The work-holding fixture in the foreground is expandable to take the V-6, V-8, or V-12 block. It does the finish-boring of the cam, crank, and balance lines from the left side; reams two idler hub pilot holes and two dowel holes in the opposite end.

1.0630-in. diameter, 1.20-in. deep and countersunk. One hole is drilled 29/32-in. and countersunk; while one hole is reamed 0.9370-0.9380 in., 1.30-in. deep. Bearing cap holes are 17/32-in. diameter 2.84-in. deep. The V-6 block requires eight holes; V-8, 10 holes; V-12, 14 holes.

Station	Operation
9	Block is rolled over 180 deg
10	Idle
11	Rough-mill undersides of bank and both sides of crankcase
12	Rough-mill tops of banks
13	Idle
14	Idle
15	Rough-mill both ends
16	Unload

Station 11 takes some extremely heavy cuts due to formation of the casting at the foundry, in at least one spot removing about $\frac{3}{4}$-in. of stock.

Next comes a succession of three Greenlee transfer machines for a variety of operations, including rough-boring, drilling, and tapping.

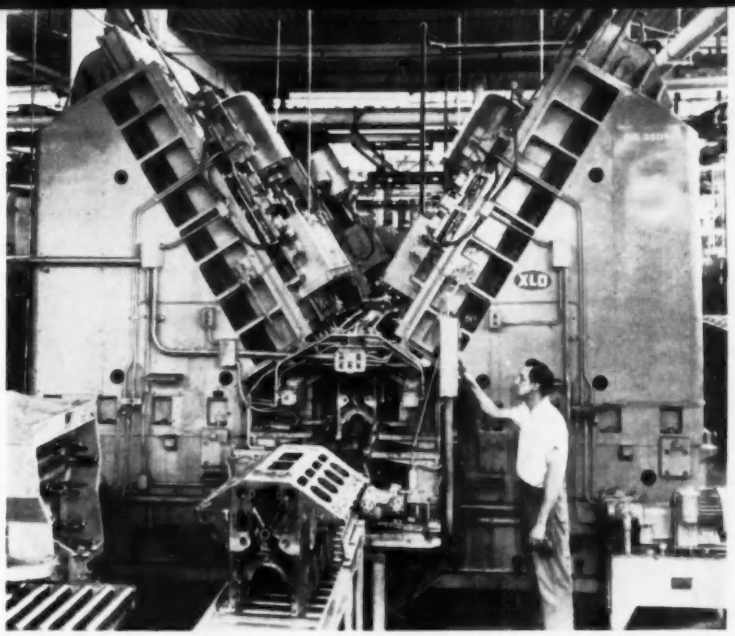
First of these is a 9-station unit for rough-boring camshaft, balance, and crank bores; and the drilling of all holes in both ends. Crank bores are roughed to 4.748-4.760-in.; cam shaft bores to 2.124-2.134-in. Typical of the changes in cycling arrangement is the fact that on V-6 and V-8 cam and balance holes are bored through two walls, while on V-12 blocks boring is done through four walls. The same holds true for rough-boring crank holes.

At Station 4, the V-12 requires 12 drilled holes; V-6, one hole 4.22-in. deep; V-8, one hole 6.00-in. deep. The V-12 has two galleries 11.00-in. deep; while the V-6 and V-8 have a gallery 5.30-in. deep, one 11.00-in. deep, and 18 other drilled holes.

Station 5 drills 11 holes in all blocks; two galleries 19.625-in. deep in the V-12 block; one 19.625-in. deep gallery in the V-8 block; 12 additional drilled holes; one one-inch diameter hole in V-6 and V-8 blocks; and two, 11/16-in. holes in all blocks.

Station 6 handles 14 holes in all blocks; one hole in V-8 and V-12 blocks; and two additional holes in all blocks.

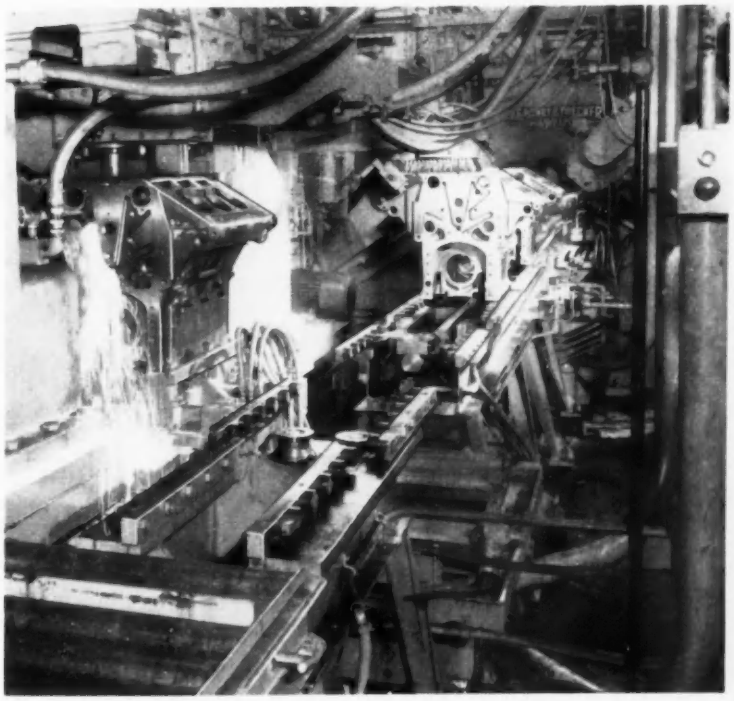
Station 7 leak tests three oil gallery holes; at Station 8 the block is turned 90-deg, and unloaded at Station 9.

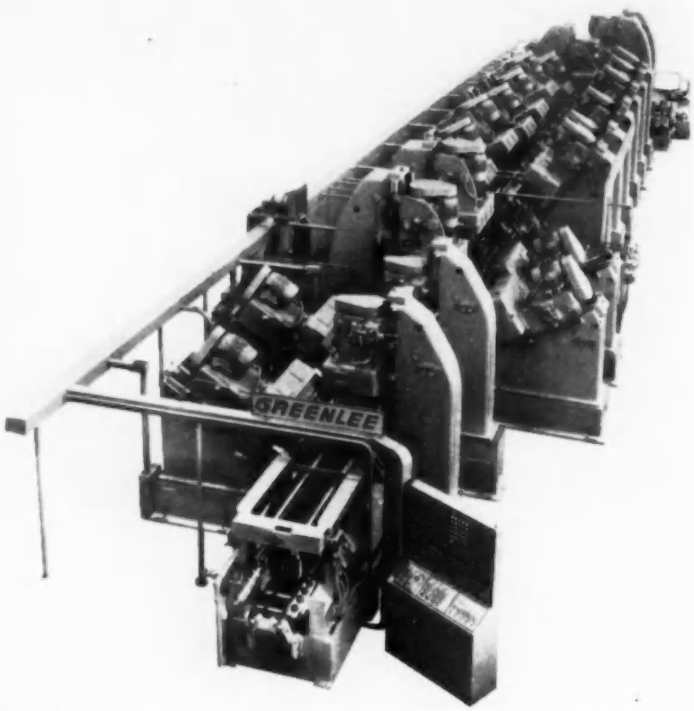


View looking into the huge Ex-Cell-O cylinder boring machine. This illustration shows the arrangement of transfer bars.

The next operation features the largest custom-built transfer cylinder boring machine ever built by Ex-Cell-O, incorporating special features that make it possible to handle V-6, V-8, and V-12 blocks in

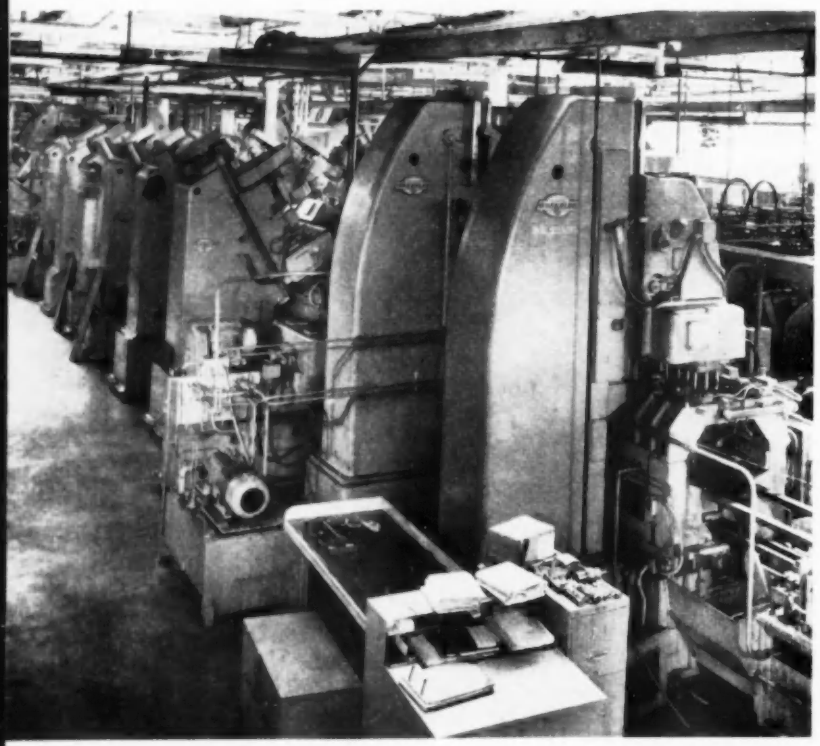
Looking into the work stations of the 14-station Kearney & Trecker transfer milling machine for finish-milling of the block all over. The station at the left, in the foreground, is for finish-milling both ends.





Perspective view of the second Greenlee transfer machine (taken on the erection floor). Of 16-station design, it handles the drilling of all holes in the top, sides, and undersides; as well as the top of the banks, panrail, and bearing cap seats.

Perspective of a portion of one of the Greenlee transfer machines taken on the machine line.



the same machine. It is operated as a five-station machine with Station 1 for loading, Station 3, idle, and Station 5, unloading. The machine is tooled and cycled for the roughboring of cylinder bores, and counterboring. As illustrated, it has three heads at the first work station; a single head wider spaced; and three heads in the second work station.

V-6 blocks are mounted on a separate transfer bar with a stroke of 32½-in. Two bores are handled at the first cluster of boring bars, then the block translates one more step for boring the center bore with the fourth spindle. The second working station remains idle for the V-6 block.

The V-8 and V-12 blocks, on the other hand, share another common transfer bar with a stroke of 52½-in. However, since the V-8 block is shorter than the V-12, it is handeled in a special shuttle fixture which makes it possible to relocate the block so as to utilize the fourth spindle in the first bank. Thus the V-8 uses the first two spindles in the cluster at first, then shuttles to complete the other two bores with the third and fourth spindles.

The V-12 block goes through on the transfer bar for boring three bores at the first bank, then the second group of three bores in the second bank. In the changeover to V-8 and V-12 blocks some of the transfer fingers have to be moved to alternate positions in set-up. It is also obvious that the second bank of boring bars remains idle when either V-6 or V-8 blocks are put through.

Blocks now move through a Kearney & Trecker rise-and-fall milling machine for milling both sides of main bearings and milling of all lock slots. This is followed by a pass through a 82-in. stroke Detroit horizontal surface broaching machine for broaching main bearing cap seats.

Now we come to the second Greenlee transfer machine with 16 stations, largest of the group, which handles the drilling of all holes in the top, sides, and undersides; as well as the top of banks, panrail, and bearing cap seats.

Here again the blocks are selectively drilled in accordance with the requirements of each one. For example, Station 2 drills 10 holes in each block; Station 3 countersinks six holes, drills three.

Station 4 is a better example of the variability of hole spacing. It handles 39 holes in the V-12 block; 29 holes in the V-8; and 24 in the V-6. In addition, each block has two galleries 9.70-in. deep and one gallery 8.80-in. deep.

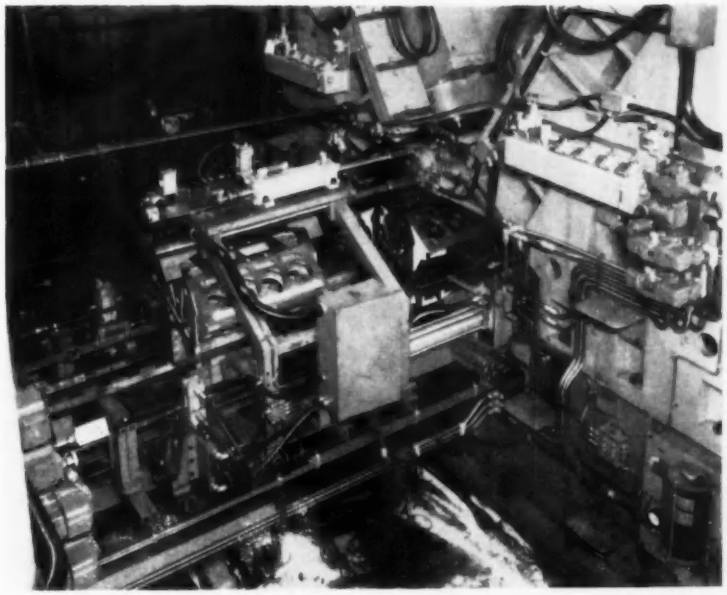
Altogether this machine accounts for 304 spindles for the V-12 block; 237 spindles for the V-8; and 204 spindles for the V-6.

The next major unit in the line is a 10-station Greenlee automatic transfer tapping machine for tapping all holes in the block. This machine utilizes 238 tapping spindles for the V-12 block; 206 spindles for the V-8; and 165 spindles for the V-6. The block is indexed into the proper positions at automatic stations along the line.

At the end of this cycle the main bearing caps are assembled, using an Ingersoll-Rand multiple nut runner with a torque of 160-165 lb ft.

The block now moves as a subassembly into the first of two Greenlee horizontal boring machines. This is a two-way horizontal unit for semi-finish-boring of cam lines and balance holes. It also handles the counter-boring of both sides of the rear main bearing. The machine is rigid and accurate, the counterbore in the rear main bearing being held to close limits as to concentricity and squareness with the crank bore.

The other Greenlee is a two-way horizontal boring and reaming machine for finish-boring of the cam and balance lines; semi-finish and finish-boring of the crank line. In addition, it reams two idler hub pilot holes and two dowel holes in each end. Cam and crank bores are held to a tolerance of plus or minus 0.0005 in. This machine is illustrated here to highlight the problem of holding such close tolerances as well as alignment of the bored lines in a piece of equipment that must handle the V-6, V-8, and V-12 block. Note particularly the long, slender boring bars for the cam lines.

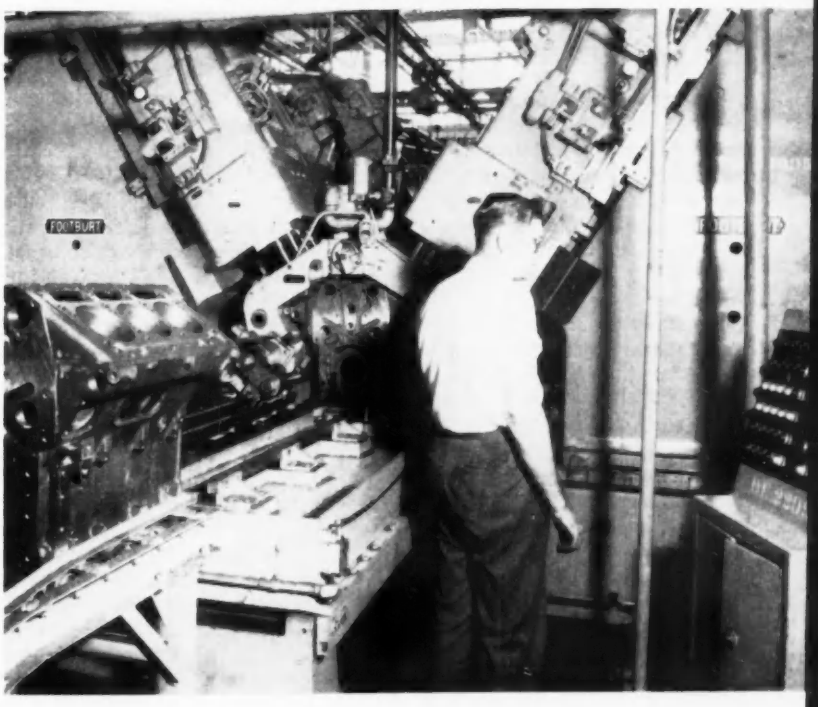


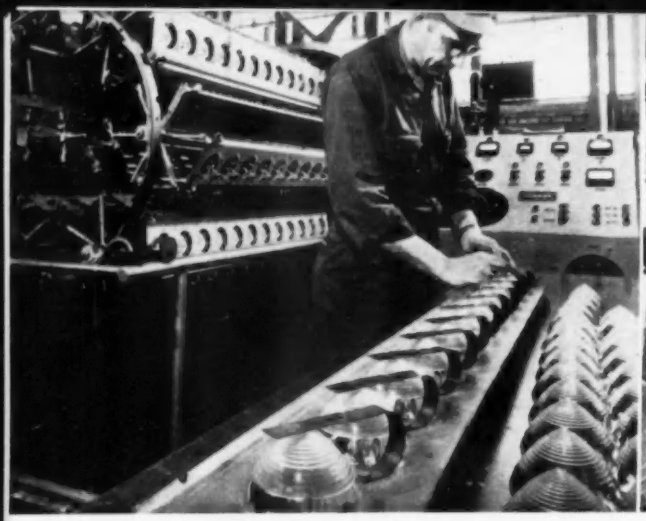
Close-up of the Ex-Cell-O cylinder boring machine, this time with a V-8 block which is handled in a shuttle station operated by an overhead auxiliary transfer bar. As explained in the text, the shuttle station is necessary for relocating the block as it moves into Station 2.

Now that most of the operations have been completed, the block enters a 14-station Kearney & Treaker automatic transfer milling machine for finish-milling the

(*Turn to page* 76, *please*)

Last major operation of the V-71 line is the counterboring of all water and oil holes in the banks. This is done in the Footburt, five-station transfer machine seen here from the control station.





Vacuum metallized back-up lamp lenses are removed from the special jigs that carry them into a Stokes 48-in. diam vacuum metallizing unit at the Brooklyn Mich. plant of the Accessory Div., Ford Motor Co. The rotating reel holds 432 lenses (Vacuum Equipment Div., F. J. Stokes Corp.).

These back-up light lenses horn button medallions, and heater opening covers are all finished by vacuum metallizing at the Brooklyn, Mich., plant of the Accessory Div., Ford Motor Co. (Vacuum Equipment Div., F. J. Stokes Corp.).

Vacuum Metallizing *Scores Automotive Gains*

Applications for Low-Cost Finishing Process Increase Due to Better Coatings, Equipment, and Other Factors

By Andrew W. Shearer
MARKET RESEARCH EDITOR

VACUUM metallizing — often called vacuum coating—is a process whereby a bright metallic film is deposited on surfaces of glass, metal, plastic, or other non-porous materials. When the metallic film is condensed on the back side of a clear material, the technique is known as "second surface" metallizing. If, on the other hand, the metallic film is condensed on the outer or primary surface of an object, the method is called "first surface" vacuum metallizing.

Briefly, the vacuum metallizing process includes the following steps: 1) Base coating parts with a resinous coating; 2) Placing parts in a closed chamber and reducing pressure to 0.5 micron or less (atmospheric pressure = 760,000 microns; 3) Vaporizing aluminum or other metal and allowing it to condense on the parts in the vacuum; and 4) Removing the parts and applying a resinous top coating over the plate.

The typical coating deposited by vacuum metallizing for decorative purposes is extremely thin, usually four to eight millionths of an inch. It is highly deflective and follows precisely the pattern of the object to be coated. Naturally, it reproduces trifling surface defects, if any, but these can be corrected by an organic base coat before metallizing. The coating fills surface imperfections and provides an exceptionally smooth and glossy surface.

Most of the automotive users are employing what is known to the industry as a two-coat system—namely, a primer base coat under the metallized surface and a clear baked varnish or resinous top coat. Thickness of the coating sandwich generally is on the order of five mils, although it may be less or greater than this depending on the application.

To date, almost all of the films have been of high purity aluminum. However, other metals, including gold, copper and nickel, to name just a few, can be deposited on materials such as acrylics, styrenes, phenolics, butyrates, nylon, Mylar, and other molded, formed, and extruded shapes of either plastic or metal. Vacuum metallizing is generally the most economical method for finishing plastics to look like metal.

MODERN DEVELOPMENTS

The principle of vacuum metallizing was discovered many years ago. However, widespread industrial usage in its early days was impeded by a lack of adequate equipment, durable coatings, and

other technical refinements. While the automobile industry, for example, was interested immediately in the production economics possible with the process, it would not accept lesser quality than obtainable with other techniques it was using at the time.

This situation has changed rapidly within the last five years. Quality requirements have not been lowered, but the vacuum metallizing process has matured to the point where metallized surfacing will stand up at least as well as baked enamel finishes. Today's coatings, which are used over the metallized surface to protect it from abrasion and wear, are tough and durable and provide excellent protection. Equally important, improved methods and equipment are today available for applying them on a production basis.

Officials of National Research Corp. examine thick-film aluminum coated and polished automobile hub cap. Included among the miscellaneous items on the desk are other automotive parts, some of which are anodized and dyed in various shades and colors from pastels to darks (National Research Corp.).

Shown here are typical aluminum coated and polished automotive trim parts. The bottom part in the photo has been bright anodized in very pale gold. The dart - shaped piece immediately above it has been bright anodized in pastel blue (National Research Corp.).

Cost Savings

The cost of vacuum metallizing is low on either plastic or metal substrate. For small parts finished in modern-day equipment, such as 72-in. or 66-in. diam vacuum coaters, the cost can be as low as three to six tenths of a cent per square inch including equipment, labor and materials. It is even lower for sheet and strip—on the order of four to five cents per square yard. One big advantage of vacuum metallizing is that the surface as coated has a brilliant lustre; no buffing is required to bring it to chrome-like brilliance. On intricate assemblies, this results in substantial cost savings over and beyond that obtained in the basic process.

Colorability

Another feature of vacuum metallizing of special interest to the automobile industry is the ease with which vacuum-coated surfaces can now be colored. Different effects—impossible to achieve with metal parts—can be obtained by molding name plates, instrument dials, escutcheons, etc., out of clear plastic, and adding color by a variety of established methods. These would include the use of colored synthetics flow coated or electrostatically applied over an aluminum coating deposited on the surface by vacuum metallizing. Practically any desired tint can be had in this type of finish with little or no increase in cost over the simulated bright chrome.

By controlling the color of the surface layer, the user can style the surface to any design requirements. Texture matching is also possible. Thus, a vacuum metallized part may be made to resemble an electroplated casting or a stainless steel stamping exactly, both as to reflectivity and texture.

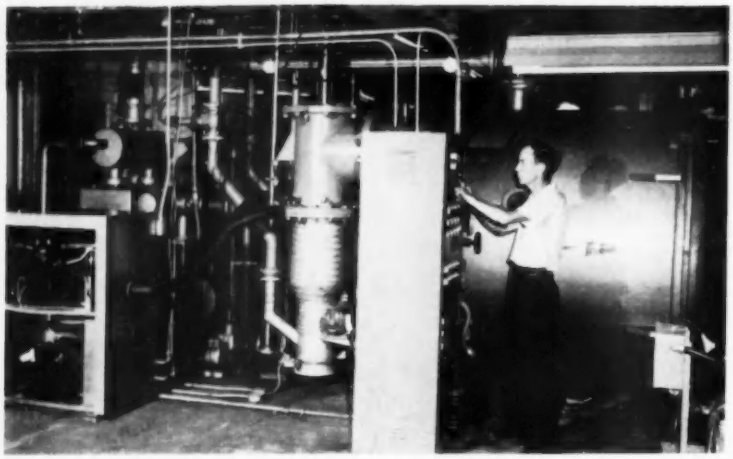
Equipment

The equipment available today to perform production coating jobs is able to handle many types of work with few modifications. The producers have come a long way in designing improved production equipment. Better materials are also available for vacuum metallizing jobs.

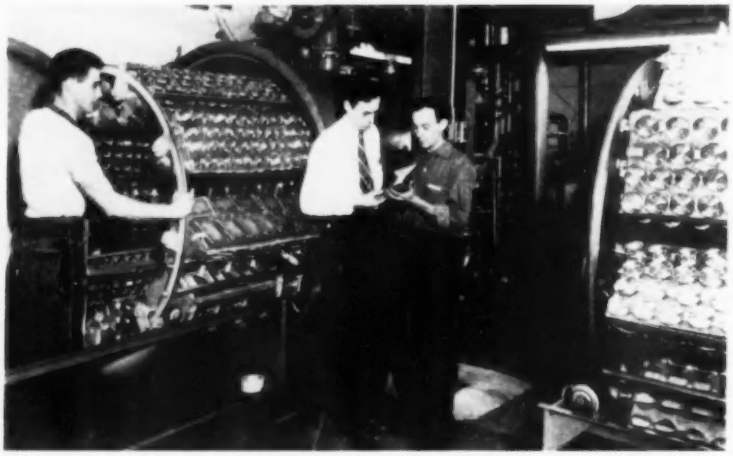
Among the developments that have been made in recent years are: strippable coatings which simplify periodic cleaning of the tank; jigs that have less excess projected surface area, are less subject to outgassing and metal build-up, and assure more uniform coating; and improved mastics to cover the nonmetallized surfaces of the work.

There is also a significant trend toward more automated controls. Spray coating, flow coating, and dipping equipment is now automatically regulated, the only manual operations being loading and unloading. The same is true of vacuum coaters, which are available with semi- and fully-automatic panels that control the vacuum cycle and rate of metal deposition.

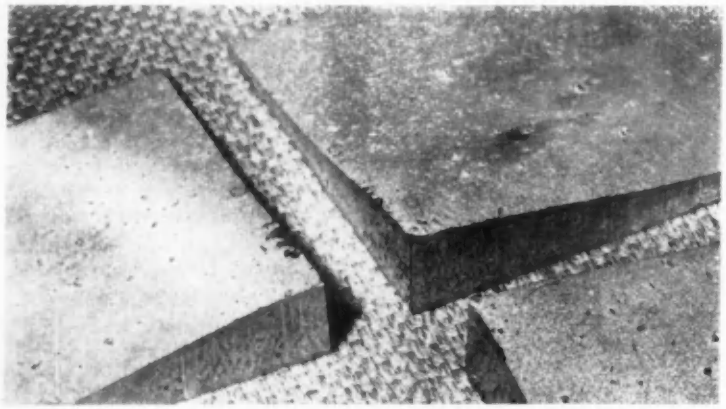
Then, too, both mechanical vacuum pumps and oil vapor pumps have been substantially improved,



Large vacuum coater installation at Kent Plastics, a major producer of second-surface metallized parts. Attached to the 66-in. coater (behind control panel) is a mechanically refrigerated cold trap and the refrigerating unit.



Automotive parts, among them Buick horn buttons, in planetary jigs at Kent Plastics. Note multiplicity of parts mounted in jig at left (NRC Equipment Corp.).



Blocks of thick aluminum accumulations deposited by vacuum evaporation using continuous metal source developed by F. J. Stokes Corp.

so that today's equipment is not only several times faster, but also requires less maintenance and fewer repairs. Mechanical pumps are used first to reduce the pressure to an intermediate valve, and then to back up the oil vapor pumps, which can create the low final pressures needed, but cannot operate against atmospheric pressure.

Introduction of the rotary gas ballast mechanical pump solved the water vapor condensation problem. In older pumps, condensed water vapor contaminated the pump oil, resulting in reduced capacity and frequent oil changes.

Mechanically refrigerated cold traps, which freeze out low density water vapor before it reaches the oil vapor pumps, can increase coater output up to 300 per cent on hot, humid days. The importance of water vapor on vacuum pumping systems can be appreciated from the fact that in one hot, humid day as much as a gallon of water may be evacuated from a production metallizer.

AUTOMOTIVE APPLICATIONS

The use of vacuum metallizing as a low-cost finishing technique for automotive parts did not really come into its own in the automobile industry until the early 1950's. The process was first employed at that time for second-surface applications on both interior and exterior trim parts. The development of more durable protective finishes has in recent years permitted the replacement of chrome-plated metal parts by first-surface vacuum metallized plastic pieces.

Second Surface Parts

Second surface coatings have opened up entirely new fields of applications on exterior and interior parts. For example, some automobiles now have vacuum metallized tail lamp assemblies. Another technique that shows great promise utilizes vacuum metallized Mylar which is then bonded to a metal base.

While these are among the first exterior applications utilizing a

plastic substrate, the automobile industry is using more and more vacuum metallized plastics for car interiors. Decorative trim, dome lights, dashboard moldings, and similar parts are indicative of this trend.

The development of improved adhesives is spurring the applications of second-surface metallizing. When the metallized plastic part is attached to a metallic base by one of these adhesives, a weather-proof, water-proof joint results that completely protects the metallized surface. Thus, there is no deterioration or peeling, and such items as tail lamps, nameplates, medallions and other parts applied in this manner will stand up for years without damaging effects.

How many exterior parts will be produced in this manner for future models is difficult to predict. Undoubtedly, the tail lamp reflector light and decorative applications will continue to expand, and additional uses will be found on such parts as station wagon trim.

However, principal automotive uses for vacuum metallizing will continue to be for interior items such as horn buttons, instrument dials, arm rests, dome lights, and the like. The industry's growing interest in plastics for interior parts that perform both a decorative and functional purpose is bound to lead to new and increased applications.

First Surface Parts

At present, the use of "first surface" metallized finishes in the automobile industry is not extensive. However, a sufficient number of applications have been and are being used today to indicate that the finish has proved itself. The "first surface" process permits the use of a variety of opaque plastics, metal stampings, die castings, and other materials. Ford Motor Co., for example, has employed first-surface vacuum metallizing for certain interior trim components for the past three years. In 1956, at the beginning of 1957 passenger car production, first-surface metallizing was applied to the main instrument cluster and odometer dials, as well as the clock, heater and radio instrument panel covers. The instrument cluster and odometer dials were one piece acetylic moldings. It was the bezel area of these parts which was metallized.

The finished product appeared to be a glass window housed in a chrome plated bezel. Thus, through clever application of available materials and technology, a one piece molding replaced an assembly of two chrome plated steel stampings, a glass disk and rubber gasket. Savings, as would be expected, were substantial.

In the case of the clock, heater and radio opening covers, high impact styrene was employed, bright finished by vacuum metallizing. The result was a much more attractive instrument panel than by former painting methods. The new trend toward first-surface coating was strengthened when Ford changed

(*Please turn to page* 78)

TABLE I

TYPICAL VACUUM METALLIZED PARTS ON 1959 AUTOMOBILES*

Ford

Horn button
Hood medallion—hot stamping
Control knobs
Tail lamp assembly
"500" medallion—trunk
Dome light
Rear view mirror mount

Pontiac

Decoration—instrument panel
Radio and heater knobs
Horn medallion
Door upholstery
Trunk medallion
"Catalina" dashboard decoration
Radio panel

Rambler

Horn medallion—standard Rambler
Dash decoration—standard Rambler
Radiator medallion—Ambassador
Radiator medallion—American
"8" Rebel
Upholstery beading—Ambassador

Cadillac

Hood medallion "V"
Horn medallion
Instrument panel decoration
Decorative upholstery
Decorative instrument panel medallion
Tail light assembly parts
Rear dash medallion
Control knobs

Plymouth

Instrument cluster decoration
Instrument knobs
Radiator medallion
Fender medallion
Metallized weave disk

Oldsmobile

No parts readily identified

De Soto

Instrument panel knobs
Steering wheel medallion

Edsel

Horn button
Instrument panel decoration
Control knobs
Front medallion
Fender medallion
Tail lamp assembly parts

Lincoln

Horn button
Control knobs
Tail lamp assembly parts

Mercury

Instrument panel decoration
Instrument cluster
Control knobs
Clock decoration
Door upholstery
Tail lamp assembly parts

Buick

Instrument panel ornament
Instrument cluster
Grille ornament
Interior door emblem
Arm rests

Chevrolet

Horn button
Upholstery beading
Instrument cluster decoration
Dash medallion and nameplate
Rear seat medallion (Corvette)
Hood medallion (Corvette)
Instrument cluster (Corvette)

Dodge

Tail lamp parts
Instrument cluster
Fender medallion
Metallized upholstery

* Based on a survey made by Consolidated Electrodynamics Corp.

Two-door Syrena has a 27-hp two-stroke engine driving the front wheels. Parts in common with the larger Warszawa include wheels, brake assemblies and steering unit.

Poland's Automobile Industry Shows Gradual Gains

WHILE Poland's automotive industry still has a low priority rating in the overall plans for industrial expansion, a visit to the recent Poznan International Fair and to the largest car factory in the country revealed that it is making slow but steady gains in both design and production of its vehicles. Output figures for last year and future plans are shown in the following table.

Thousands of units	(actual) 1958	(planned) 1960	1965
Cars	12.7	20	37
Trucks	12.1	19.8	30.5
Buses	1	2.2	3.6
Tractors	3.5	7.0	19.5

The industry is entirely a post-war venture and is operating under a number of severe handicaps: the country has few specialized component manufacturers, and not enough trained workers; sheet steel and other basic materials are in short supply; and there is a lack of foreign currency for buying modern equipment abroad. Details of these problems were outlined in AI of August 15, 1958.

But an interesting new development pointing to a possible easing of the situation is the forming of closer ties with the West, despite the fact that some of the main Polish automobile factories were built with Soviet credits and tooled largely with Russian machines. For example, the Zeran car plant has just received its first post-war shipment of American machine tools—a set of five Gleason gear-cutters—purchased under the recent U. S. loan to Poland. This factory has also engaged the Italian stylist Ghio to design a new line of Warszawa models scheduled for production in 1962.

During the Fair an agreement was signed to buy 2200 Spanish-built Barreiros Diesels in exchange for 1800 Starachowice 4-ton truck chassis without engines, which hitherto have been powered by side-valve gasoline units. As a co-production barter deal this filled a need on both sides.

Among the newest vehicles shown at Poznan was the Mikrus, Poland's first baby car and the combined product of three aircraft factories. The 990-lb automobile has an 18-cu in. two-stroke engine at the rear, and suspension is by coil springs and swing axles on all wheels. Production is planned to reach 10,000 yearly.

Also exhibited for the first time was the Syrena, a small front-drive car built at Zeran and sharing a number of parts with the larger Warszawa. It is of conventional construction with a separate chassis frame, but the 27-hp engine is inadequate for the 1890-lb curb weight, and changes to improve performance and economy are under way.

The heavy Warszawa sedan (based on the now-extinct Russian Pobieda) is as yet unaltered, although the basic chassis with integral body floor is now being supplied to other factories for fitting small bus or truck bodies. One of these derivatives is the Zuk pick-up made in Lublin. It has a forward-control one-ton body formed from ribbed steel pressings. It is powered by the standard 129-cu in. side-valve engine developing 57 hp at 3800 rpm.

A new tractor exhibit was the Ursus C-325, which will replace the outdated machine similar to the pre-war Lanz Bulldog that Poland has been making for the past dec-

By David Scott
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

ade. This model has a 25-hp two-cylinder Diesel engine with transmission providing six forward and two reverse speeds. It features a hydraulic lift with three-point linkage, a differential lock, and a rear-axle height varied by repositioning the drive-wheel reduction gear housings.

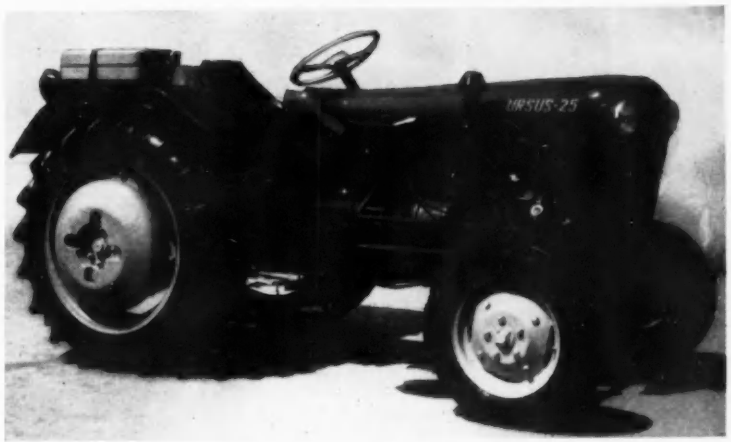
In Warsaw the writer visited Zeran after an interval of three years (AI, August 15, 1956) to find a certain amount of overall improvement. Annual production rate has increased from 6000 to 21,500, a number of important machines have been added, and there are new installations for the Syrena car.

Yet the factory is still facing a variety of problems in addition to those already cited which affect the entire Polish industry. While production has nominally crept up to 86 per cent of the planned capacity of 25,000, the Syrena accounts for 3500 of the existing total. Since this model did not figure in the original plans, additional equipment was needed to make it.

The remaining 18,000 is only 72 per cent of capacity, and brakes down as 12,000 Warszawa cars, 4000 pick-ups, and 2000 bare chassis for other factories. One explanation put forward for this under-production is paradoxical. Although there is a tremendous pent-up demand for cars in Poland, government officialdom has arbitrarily priced the sedan out of the home market, tagging it at twice its production cost. Zeran had no say in this matter, and hence must confine output to match sales possibilities.

Meanwhile, there is real scope for selling the cheaper Syrena and the popular pick-up truck, but present manufacturing facilities restrict production to levels well below the demand. The supply of body pressings and bought-out engines for the Syrena is limited while the pick-up body — though simple — is formed with plastic dies whose short life curbs output.

The baby Mikrus is powered by a rear-mounted two-stroke engine developing 15 hp. Its components are produced by several different aircraft factories.



New Ursus tractor has a 110-cu in. Diesel engine rated at 25 hp at 2000 rpm, driving through a six-speed transmission with two reverse ratios. A three-cylinder version is also in production.

Zuk one-ton pick-up truck is built at Lublin with integral chassis-floor supplied from Zeran.

Unitary chassis of the Warszawa car, a replica of the Russian Pobieda, forms the basis for a 10-passenger microbus and two pick-up trucks with load ratings of 1100 and 2000 lb.

At the same time inflexibility of the original tooling discourages both modernization of the overweight Warszawa with its 1945 body, and making parts for the more saleable Syrena to boost its output. A number of the machines are automatic units intended for long production runs, which do not lend themselves to easy changeovers. For example, while the Soviet transfer line for drilling and tapping the engine block can handle 40,000 castings yearly, it is idle two-thirds of the time, but the cost of retooling it (together with other automatic units in this section) to make an improved engine has so far been prohibitive.

Parenthetically, it was learned that spares for many of the Russian machines are now virtually unobtainable, forcing the factory to make parts itself. One explanation is that the Soviets are today concentrating their exports of capital equipment on Communist China, the Middle East and certain western countries, with eastern Europe reduced to a low priority.

An uneconomic degree of self-sufficiency is another major problem at Zeran. The weakness of the supporting industry still requires it to make a very high proportion of components that normally would be bought out, resulting in a wasteful dispersal of scarce facilities and labor. These include not only simple items like valves and brake shoes, but parts such as bearing inserts, pistons, oil pumps, brake cylinders and even wheel alignment equipment.

The exceptional Polish practice of publicly disclosing actual production costs brings to light another anomaly. The figure given for the Warszawa is just over 58,000 zlotys, or approximately half the domestic retail price of 120,000, but the car is sold abroad for $1200 in order to find customers for it and earn much-needed foreign exchange.

In effect, Poland is thus buying hard currency at the near-black-market rate of one dollar for 50 zlotys (or more, if one assumes a profit), against the official rate of 4 zlotys to a dollar and the special tourist rate of 24. This suggests questionable economics, particularly when the car embodies a sizeable content of imported materials worked with foreign machines—which must be bought with the foreign currency at world market prices.

On the brighter side, Zeran is optimistic about the sales and export prospects of its forthcoming Ghia-styled car with an overhead-valve engine, and is looking forward to getting more production equipment from the West. The Gleasons already mentioned, which will be used for cutting gears for the new hypoid axle, were warmly welcomed.

Now there are hopes of buying honing machines, gear grinders and heat treatment equipment from America, Britain or West Germany. One by-product of this may be closer business and technical links with the large Polish-American element in the Detroit area.

Presses and especially body dies for the new model also have high priorities. The press shop is one of the more neglected sections of the factory, but during the past year or so it has obtained several new machines, including a long-awaited triple-action Pels from East Germany for making the body roof, floor and side panels, these stampings having previously been imported from Russia. In addition, a Soviet scrap baler fed by under-floor conveyors was being installed at the time of this visit.

Dependence on foreign materials will also be minimized, further reducing costs. Engine blocks are already being cast in Lublin, replacing Russian imports. Later this year the new 1.5-meter (59-in.) wide strip mill at Nowa Huta in southern Poland will supply the large sheets needed for major body panels which so far have been bought mainly in West Germany and America.

These and other improvements, it is stated, will contribute to the doubling of production by 1965. According to present plants, output in that year will total 45,000 units, comprising 27,000 cars and 18,000 chassis and pick-up trucks. ■

Caterpillar Introduces SynchroTouch Transmission Control

FINGER-TIP shifting of Caterpillar DW20 and DW21 tractors is provided by the SynchroTouch transmission control, introduced as optional equipment by Caterpillar Tractor Co. Manual shift transmissions will continue to be available for the tractors.

A prime advantage of the new transmission control is its feature of permitting operators to shift up or down instantly, by dialing the desired gear range. Shifting time is reduced to a fractional-second interval, with the added benefit of effortlessness.

The SynchroTouch is controlled by a gear selector, located to the right of the operator at arm level. The selector is mounted on top of the control box, and replaces the gear shift lever. The standard clutch foot pedal is retained, but used only when the machine is started from a standstill.

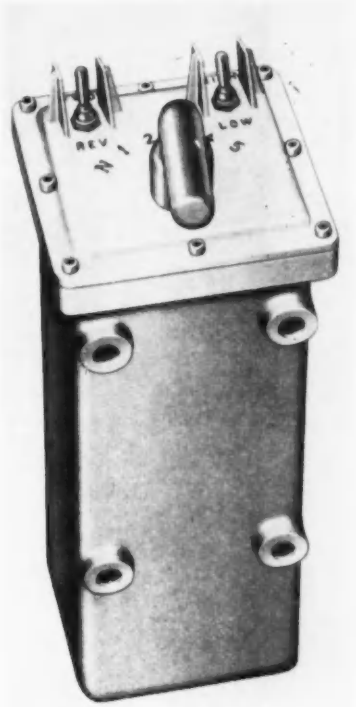
The direct drive transmission of the DW20 and DW21 is not changed. The only changes are in the shifter shafts, forks, shaft brackets, transmission covers and shifting linkage. These components are replaced by the SynchroTouch shifting device. With the SynchroTouch in place, the shifter shafts become pistons housed in hydraulic cylinders. Hydraulic pressure is supplied by a vane-type pump mounted at the rear of the engine, driven by the timing gear train. Action of the hydraulic system is controlled electrically, actuated by the operator's selector switch.

In normal operation, full gear-changing action takes place in a fraction of a second. The operator dials the gear selected, which disengages the master clutch by air pressure. After clutch disengagement, the shifting collar is hydraulically disengaged, putting the transmission in neutral.

If the operator is up-shifting, the shifting collars are automatically brought to approximately the same rpm, and hydraulically shifted into place to accomplish the gear-range change. Air is then exhausted from the clutch roto-chamber, permitting the clutch to re-engage.

When down-shifting, the governor control reduces the rack to the low-idle position, creating a momentary reversal of power through the transmission, during which time the down-shift takes place.

The foot-operated clutch pedal is used only when shifting from neutral to a gear range from a standstill. This safety feature precludes the possibility of operators setting the machine in motion by inadvertently manipulating the gear selector. ■



The SynchroTouch transmission control is controlled by this gear selector located to the right of the operator at arm level. Shown here is the selector for the DW20. It has two flip switches; one for forward-reverse; one for high and low range.

Federal Design Standards for Cars Are Unnecessary

The automobile industry has urged expanded federal research into highway design, traffic engineering and "the human aspects of motor vehicle operation."

The Engineering Advisory Committee of the Automobile Manufacturers Association presented the industry's position on five bills in a statement to the House Permanent Subcommittee on Health and Safety, headed by Kenneth A. Roberts (D. Ala.)

The industry also endorsed the objectives of a proposal by Congressman Roberts (HR-1341) to equip the Government's passenger-carrying vehicles with specified safety features, saying: "We feel that Governments should set an example for the public by adopting available safety equipment for use on Government-owned vehicles."

However, it questioned the need for federal specification of automotive design standards as "an unnecessary duplication of effort and expense."

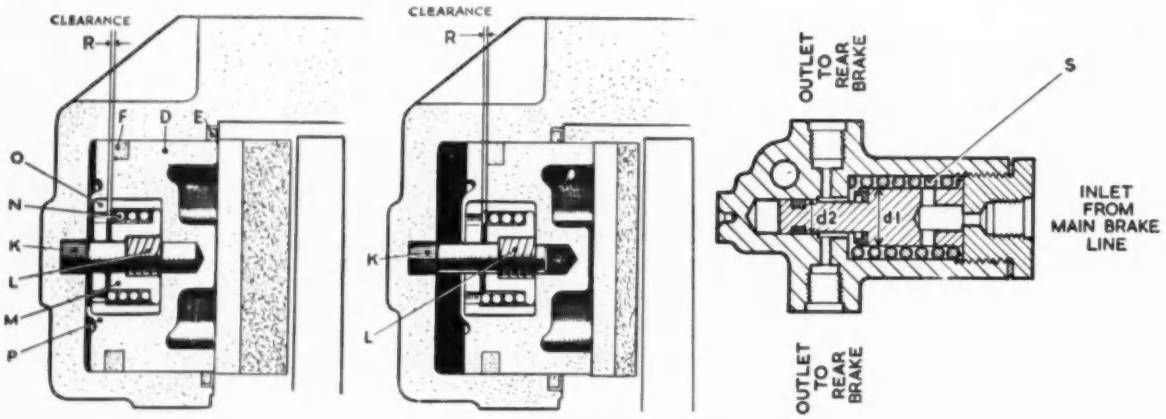
Austin A99 on a 108-in. wheelbase has a 177.8-cu in. engine developing 112 hp at 4750 rpm

Austin A99 Features Larger Engine and Disk Brakes

EUROPE'S largest automobile manufacturers, the British Motor Corp., has introduced the new Italian-styled Austin A99 as its bid for "economy-car" sales in North America as well as for the "big-car" market elsewhere in the world. Built on a 108-in. wheelbase, the six-seater Farina body is 187½ in. long, 68½ in. wide and 59 in. high. Though conventional in design, the A99 includes a number of unusual engineering features, particularly in the engine and brakes.

The engine is developed from the existing B.M.C. six-cylinder unit, but the cylinders are bored out to increase displacement from 161 to 177.8 cu in. Rating is now 112 hp at 4750 rpm, representing a 22 per cent power gain to which improved breathing also contributes. There are two S.U. carburetors, double valve springs, a sine-form camshaft, and dual exhaust manifolds.

Contrary to usual practice, the inlet manifold is water-heated by a detachable jacket formed by a one-



The Austin A99 engine

piece casting, incorporating induction and exhaust ports, that bolts onto the head and block. It is claimed that this system gives a more rapid warm-up than an exhaust hot-spot during the period of light loading that often follows a cold start, and that the inlet pipe temperature is stabilized under all weather and driving conditions.

The standard transmission comprises three synchronized ratios plus an automatic two-speed overdrive operating on 2nd and 3rd gears, giving a total of five forward speeds. An overrunning clutch permits clutchless shifting at speeds under 30 mph, above which it is automatically locked to provide engine braking. A Borg Warner fully-automatic transmission is available as an optional extra.

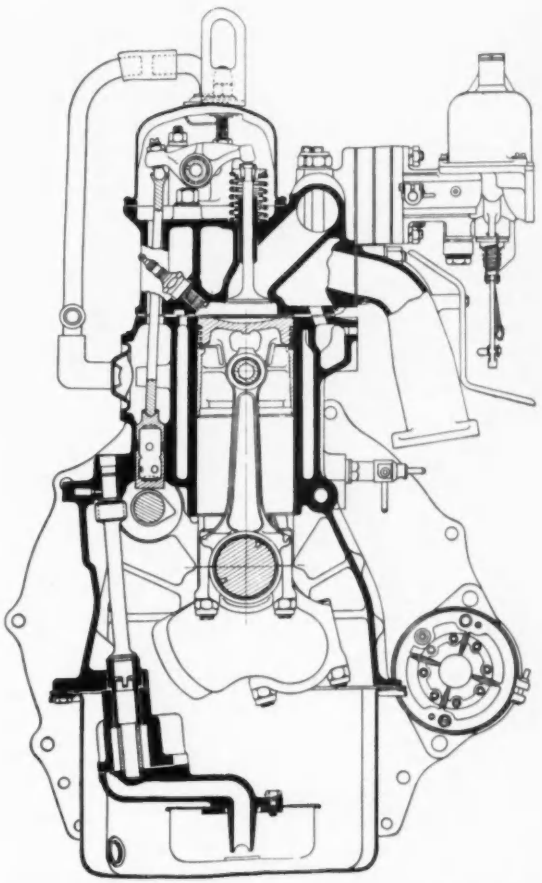
Lockheed disc brakes of 10¾-in. diameter in front are also standard equipment, and these feature automatic compensation for lining wear. Construction of these units is shown in the accompanying illustration. Controlling elements are outer sleeve O (recessed and peened in the piston D) and inner sleeve M, which is carried on post K (pressed into the caliper housing) and axially located by square-section spring L.

This spring is tightly wound to grip post K, and fully compressed to act as a distance piece. Return spring N separates the two sleeves by the clearance R, corresponding to the desired gap between the friction pad and the disk.

During brake actuation sleeve O advances with the piston. It will eventually contact sleeve M as the pad wears, thereby forcing spring L forward to a new location-position, re-establishing the clearance when the brakes are released.

Owing to the high pressures required for disk brakes, the entire hydraulic system is boosted by a Lockheed vacuum servo whose output is directly proportional to the applied pedal pressure. Conventional 10- by 3-in. drum brakes are used for the rear of the A99. But since these handle only about a third of the braking energy, any tendency for them to lock because of weight transference to the front wheels is minimized by a pressure-limiting valve in the hydraulic circuit to the rear brakes.

This consists of a simple double-diameter cylinder bored in the T-junction housing connecting the main brake line to the two rear wheels. A reaction spring holds the valve piston open until the hydraulic pressure exceeds the predetermined limit, after which the piston moves forward to seal the outlet ports and all further braking force is transferred to the front wheels. ■



Details of the Lockheed disk brake. Components are identified in text of article.

International West Coast SAE Meeting To Be Held at Vancouver

The Society of Automotive Engineers is to meet in Canada. Announcement from the Society's headquarters in New York said the SAE International West Coast Meeting has been scheduled for August 10 to 13 at Vancouver, B. C. The program will be featured by reviews of the engineering phases of the operation and maintenance of heavy duty on- and off-highway motor vehicles and of Diesel engines on land and sea.

The program provides also for presentation of technical papers on marine gasoline, engine noise, progress in truck tires, design and use of heavy duty accessories and systems, fuels and lubricants, braking equipment and lubrication as a maintenance operation.

This international meeting is sponsored by the SAE Diesel Engine, Fuels and Lubricants, Transportation and Maintenance and Truck and Bus Professional Activities. Cooperating are the SAE British Columbia, Northern California, Northwest, Oregon, San Diego, Southern California and Spokane - Intermountain Sections and the SAE Salt Lake City Group. General Chairman is C. H. Willis, of Home Oil Distributors, Ltd., Vancouver.

■

New techniques for handling and machining crankshaft bearing cap clusters, adapted in this new 30-station Cross Transfer-matic represent a complete departure from conventional methods. Changes in methods and new machine features include improved bolt hole processing, lift and carry part transfer, a new sawing head and fixture and new material handling and fixturing.

New Transfer Machine

Unique Handling and Machining Techniques Incorporated in 30-Station Unit

A 30-STATION transfer machine for drilling, tapping, milling and sawing of crankshaft bearing caps at a rated capacity of 436 pieces per hour has been designed and built for a European automobile manufacturer by The Cross Co., Detroit. New techniques adopted for handling and machining bearing cap clusters represent a complete departure from conventional methods

The new approach has resulted in simplified machine design, and improved machine operation and dependability. Both predictable and unpredictable down time have been reduced considerably. Among the major changes in processing and machine features are a lift and carry transfer mechanism, new material handling and fixturing, a new sawing head and fixture, and improved bolt hole processing.

Unlike most American designs, the European bearing caps require a number of drilling, reaming, tapping, forming and milling operations on the end caps. These differences gave rise to the new processing methods. Because of these operations, the cluster is transferred and machined with the centerline at right angles to the direction of the transfer movement. Ordinarily, bearing cap clusters are machined and transferred on their sides, front or rear end leading. However, U. S. designs generally do not require end operations.

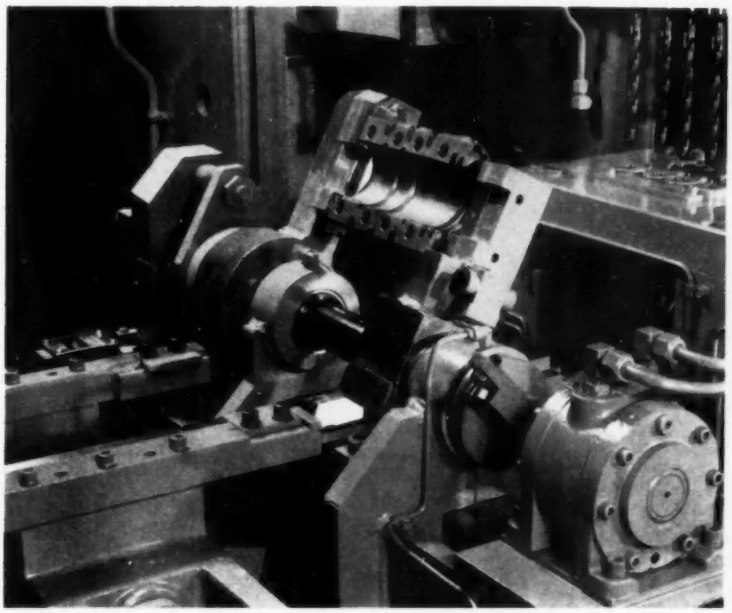
Uncommon operations called for on the European caps include drilling and tapping of a group of holes in the No. 1 bearing cap for mounting a fan belt cover; milling the back side of a lug on the No. 1 cap; and forming felt seal grooves on both the No. 1 and 4 bearing caps.

In the new Transfer-matic, these operations are performed by horizontal units while the bolt hole drilling, lock slot milling and oil slinger groove milling are performed by vertical units. Sawing of the clusters into individual pieces is performed by a special horizontal unit at the end of the machine.

Primary attention was given to the bolt hole processing, since the size and location of these holes seriously affects life of the saws employed in cutting the cluster into individual pieces at Station 30.

In the sawing station, locating pins are placed in all of the bolt holes to hold each cap securely during sawing and to prevent movement of caps after they have been cut into individual pieces. The slightest movement of the caps pinches the saws as they withdraw from the work, and results in breakage of carbide tips. For this reason, clearances between the locating pins and bolt holes are critically important.

In the new machine, close limits are held by drilling and reaming bolt holes from the side opposite the joint face. With this approach, drill wander from drills that are ground slightly off center does not affect center distance of the holes where the locating pins enter them.



This new turn-over transfer mechanism lifts the bearing cap cluster out of Station 19, turns the part over and lowers it into Station 20. A similar mechanism is employed for indexing the part 140 deg and placing it onto the shuttle-transfer bar mechanism that carries it into the clamping fixture in the sawing station at the end of the machine.

A new gang sawing unit, part-holding fixture and material handling device have been developed for presenting the cluster to the sawing station, holding the cluster during actual machining and for cutting the cluster into four individual pieces.

The sawing unit for cutting the cluster into individual pieces is a horizontal way-type unit employing a special gang milling cutter head. The three-cutter setup is mounted on a single arbor powered by a 40 hp motor through a belt driven gear train.

The head, motor and driving mechanism are mounted on a standard No. 128 Cross Feed Unit and Wing Base. In operation, the sawing unit cuts the cluster into individual caps as it feeds into the forward positive stop.

Processing

Parts are received by the 30-station Transfer-matic with the bearing face and joint face finish broached. The cluster is loaded into the machine with joint face down, No. 1 bearing to the left hand side.

In Stations 3, 4 and 8, drilling, chamfering and tapping operations on the end of the block are completed by horizontal units. These holes, not usually found in U. S. bearing caps, make up a hole mounting pattern for the engine fan belt cover.

Bolt holes are drilled, reamed and spotfaced in Stations 3, 4, 7, 8 and 9. Final operations on these holes are performed at Station 21 after the part has been turned over

At Station 12, a horizontal single-spindle milling unit on the left hand side face mills the back side of a lug on the No. 1 bearing cap. Simultaneously, a cross-facing unit generates two felt seal grooves on the No. 4 bearing cap. A felt seal groove on the No. 1 bearing cap is machined in two steps by a combination cross-facing unit at Stations 15 and 17.

Following 180 deg turnover of the cluster from Station 19 to Station 20, a combination vertical drilling and gang-milling head chamfers all eight bolt holes on the joint face side and mills anchor lock notches in all four bearing caps at Stations 21 and 22.

After two oil slinger grooves are milled on the No. 4 bearing cap and both sides of the bearing diameter of the No. 2 cap are chamfered at Station 25, the part is turned over 140° from Station 28 to Station 29. The turnover mechanism lowers the cluster onto a shuttle-transfer bar mechanism with the joint face down.

The cluster is then shuttled to Station 30—the final station in the machine where it is clamped and sawed into four separate bearing caps making up one complete set. As the shuttle-transfer bar carries the cluster into Station 30, the bar automatically unloads (ejects) the preceding clusters into an unloading chute completing operations in the Transfer-matic. ■

• • •

New Willys President

S. A. Girard, 47, has been named president and chief executive officer of Willys Motors, Inc., succeeding Edgar F. Kaiser, who now becomes board chairman.

Girard, formerly vice-president and general manager of Willys, joined Kaiser Industries in 1938 at Grand Coulee Dam, served at the Vancouver shipyards during World War II, and came to Kaiser-Frazer at Willow Run in 1947. Girard also is president of the Willys Overland Export Corp., and a vice-president of Kaiser Industries, Inc., the parent company.

Girard was elevated along with the vice presidents and general managers of three other Kaiser affiliates: Kaiser Steel Corp., Kaiser Aluminum & Chemical Corp., and Permanente Cement.

AUTOMATION NEWS REPORT

AUTOMATIC CONTROLS

PRODUCTION—VEHICLES—AIRCRAFT

By Samuel Cummings

RENAULT CITES GAINS

Renault of France reported that automation has brought about a sharp rise in its employment and production and a great improvement in the quality of its cars.

Automation has resulted in a 60 per cent increase in employment in the past 20 years—most of it since the end of World War II, according to P. E. Bezier, head of Renault's Machine Tool Div. Most of this increase, took place in the better-paying classifications, he pointed out, citing a 100 per cent rise in the number of draftsmen and designers, a 300 per cent rise in electricians.

Production per worker during this period increased five-fold, Bezier said. In 1938, Renault turned out 55,000 vehicles with 34,000 employes; in 1958, with 58,000 workers, it turned out 431,000 vehicles.

There has also been an important decrease in the number of parts rejected, Bezier reported. Citing cylinder blocks as one of the most difficult parts to machine to proper accuracy, he pointed out that rejects have dropped from 13 per 1000 to 3 per 1000 since automation was introduced.

MACHINE THAT THINKS

The Dept. of Commerce has issued two reports on the Navy's Perceptron, the "discriminating machine" that thinks for itself.

The electronic brain, still in the development stage, is described by its designer, Frank Rosenblatt, as the "first machine capable of having an original idea."

The electronic brain model, according to Rosenblatt, who authored both reports, is based on the "theory of statistical separability."

The first report describes Rosenblatt's work at Cornell Aeronautical Laboratory and part of his research on "Project PARA" (Perceiving and Recognizing Automation) after the Navy assumed sponsorship of the idea in 1957.

The report also discusses design of the Perceptron, and the principles and methods of electronic simulation of the human brain.

The second volume deals with such matters as probalistic mathematics versus symbolic logic, the importance of perpetual processes for automata, the continuous transducer neuron, and the organization of the Perceptron.

Both volumes are available from the Office of Technical Services, Dept. of Commerce, Washington 25, D. C. Order: PB 151247 *The Perceptron: A Theory of Statistical Separability in Cognitive Systems*, $4; and PB 151247-S *Two Theorems of Statistical Separability in the Perceptron*, $1.25.

YALE & TOWNE INSTALLS RAMAC

Yale & Towne Mfg. Co. claimed a first for the industrial lift truck industry when it installed an electronic control system to speed parts deliveries at its Material Handling Div.

Heart of the new system is the IBM RAMAC 305, located in the Yale headquarters plant in Philadelphia. The computer, which stores up to five million characters in its memory system, will be used to speed many thousands of different replacement parts for lift trucks and hoists to users from any of its factories or branches. In addition it will help maintain adequate stocks in depots and branches throughout the country, and also bill the customer. ■

Operation of IBM RAMAC 305 is demonstrated to Gilbert W. Chapman, Yale & Towne president (left) and Thomas J. Watson, Jr., president of International Business Machine Co. Machine is nerve center of first completely electronic inventory control system to be installed in materials handling industry.

• • INDUSTRY STATISTICS • •

WEEKLY U.S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending July 18	Weeks Ending July 11	Year to Date 1959	Year to Date 1958
PASSENGER CAR PRODUCTION				
Total—American Motors	10,181	9,692	241,528	103,653
Chrysler	1,878	2,110	50,013	34,221
De Soto	1,000	1,137	33,885	22,583
Dodge	3,140	4,701	106,769	64,111
Imperial			11,919	8,128
Plymouth	11,801	11,940	285,205	222,975
Total—Chrysler Corp.	17,819	19,888	487,792	352,018
Edsel	451	419	24,422	7,277
Ford	31,921	30,353	905,866	544,476
Lincoln	395	395	16,889	15,484
Mercury	2,300	3,114	89,596	68,631
Total—Ford Motor Co.	35,067	34,281	1,036,773	635,868
Buick	3,871	3,875	150,794	133,111
Cadillac	3,370	2,658	96,826	83,472
Chevrolet	35,469	33,692	970,951	777,803
Oldsmobile	9,267	8,973	246,233	193,268
Pontiac	9,516	9,292	270,667	130,172
Total—General Motors Corp.	61,493	58,490	1,735,471	1,313,826
Total—Studebaker-Packard Corp.	3,225	2,643	96,261	22,352*
Checker Cab			2,839	2,084
Total—Passenger Cars	127,785	124,994	3,600,664	2,429,801
TRUCK AND BUS PRODUCTION				
Chevrolet	8,709	8,908	236,893	161,577
G. M. C.	2,328	2,054	52,830	34,490
Diamond T	94	103	3,599	3,146
Divco	80	80	2,132	1,548
Dodge and Fargo	1,657	1,804	47,750	33,747
Ford	6,745	6,649	196,388	123,920
F. W. D.	29	22	568	776
International	2,953	2,825	84,966	52,469
Mack	354	326	9,554	8,324
Studebaker	333	282	7,869	5,979
White	432	120	10,687	9,655
Willys	2,544	2,325	66,899	46,001
Other Trucks	70	70	2,118	1,730
Total—Trucks	26,328	25,568	722,259	483,362
Buses	30	30	1,585	1,851
Total—Motor Vehicles	154,143	150,592	4,324,508	2,915,014

* Includes Packard.

1959 NEW REGISTRATIONS

Arranged in Descending Order According to the Five Months 1959 Totals

Make	May 1959	May 1958	Five Months 1959	Five Months 1958
NEW CARS				
Chevrolet	139,578	118,515	608,347	538,477
Ford	135,713	89,196	592,363	413,375
Pontiac	38,727	20,700	162,985	102,997
Oldsmobile	35,337	28,819	159,852	141,405
Plymouth	41,088	36,924	154,441	167,548
Rambler	35,279	16,847	139,632	61,264
Buick	23,411	22,951	113,238	120,872
Cadillac	13,027	11,959	63,814	57,292
Mercury	13,792	12,590	63,445	58,771
Dodge	14,983	11,924	57,068	57,799
Studebaker	12,370	3,808	56,039	17,286
Chrysler	6,452	5,299	25,426	27,551
Edsel	4,156	3,355	20,394	18,749
De Soto	4,439	4,322	18,625	22,625
Lincoln	2,515	2,327	13,006	13,530
Imperial	1,656	1,253	7,570	7,316
All Others	53,465	32,695	233,542	130,695
Total—All Makes	575,988	423,484	2,489,787	1,957,752
NEW TRUCKS				
Chevrolet	30,498	23,183	136,364	98,898
Ford	25,033	17,413	110,692	79,232
International	9,797	7,533	39,195	36,386
G. M. C.	6,374	4,733	29,122	21,162
Dodge	4,359	3,271	22,494	15,773
Willys Truck	1,406	987	7,035	5,238
White	1,400	1,131	6,173	5,055
Mack	1,221	1,125	5,822	4,640
Willys Jeep	708	459	3,390	2,303
Studebaker	536	424	2,603	1,899
Diamond T	201	245	1,035	1,175
Brockway	106	70	452	327
All Others	3,621	2,664	16,742	11,506
Total—All Makes	85,258	63,238	381,119	283,594

Note: All 1959 figures are based on 49 States totals. Report for State of Oregon not available at time of going to press.

Source: Based on data from R. L. Polk & Co. All rights reserved. Re-use prohibited.

SUPPLY AND DEMAND IN NEW PASSENGER CARS IN CANADA (in '000's)

Imports

	Production	U.S.A.	U.K.	German & Other	Supply*	Sales	Change in Stocks
1955	377.6	27.4	15.0	6.1	400.4	387.0	+13.4
1956	374.2	38.8	20.7	16.6	425.2	408.2	+17.0
1957	339.2	17.4	26.9	24.4	388.3	381.4	+ 6.9
1958	297.0	17.8	47.5	38.8	383.3	376.1	+ 7.2
1958—1st Qtr.	83.6	5.2	10.0	7.5	98.8	88.7	+10.1
2nd Qtr.	99.0	4.7	13.8	9.3	122.0	121.5	+ 0.5
3rd Qtr.	35.8	2.1	10.4	9.4	55.7	82.4	−26.7
4th Qtr.	78.6	5.8	13.3	12.6	106.8	83.6	+23.2
1959—1st Qtr.	95.5	—	—	—	—	99.9	
April	36.7	—	—	—	—		

* Supply = production plus imports minus exports.
Source—The Bank of Nova Scotia.

RETAIL CAR SALES BY PRICE GROUPS*

APRIL, 1959

Price Group	Units†	% of Total	Dollars	% of Total
Under $2,500	148,250	28.50	$ 343,401,288	23.61
$2,501 to $3,500	321,341	61.77	887,294,275	60.98
$3,501 to $4,500	32,363	6.22	123,588,799	8.50
Over $4,500	18,263	3.51	100,450,706	6.91
Total	520,217	100.00	$1,454,735,068	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.

†—New registrations of American made cars only. Does not include imported foreign cars.

Observations

By Joseph Geschelin

Parts Makers

In the past we have made mention on many occasions the intrinsic value of parts makers to the automotive manufacturers. Although National Standard Co. is not a parts maker in the sense that it supplies products directly for OEM use, it does supply specialty flat spring steel to spring makers; wire bead of various kinds of tire making; wire cloth for air cleaners and other accessories; armor sheathing for hose and high pressure hydraulic lines; and a host of other specialty items with end uses in automotive equipment. The thing we want to stress, however, is that like parts makers, National Standard's major contribution lies in making its extensive research and development facilities available to its customers. Thus it plays a major role in the search for special steels and alloys that can live in high temperature environment; the development of special coatings on braid and other bead materials for tires of advanced character. In the latter case, in addition to developing the material and methods for its application, the company also develops the unique coatings required for proper adhesion to the many types of rubber and synthetic compounds employed by individual tire makers. It is these specialized research facilities and people and know-how that combine to make National Standard an important member of the automotive research team.

Nickel Progress

Recent summary from International Nickel indicates how much the automotive industries depend upon nickel; and conversely what the automotive industries mean to nickel producers. According to this report about 42-million pounds of nickel were consumed in electroplating operations, about 75 per cent of all this being consumed in the automotive industries. Moreover, more nickel was used in 1958 in the production of stainless steels than in any other kind of material. Finally, it is noteworthy that more than 15-million cast crankshafts made of ductile iron have been produced by a large motor car builder (guess who) since 1949.

Spare Tire

During the period immediately preceding World War II the writer had a brief tenure as a consultant to a short-lived Government organization called OPACS, later broken up into OPA and OCS. In any event, this agency eventually issued an order outlawing the spare tire over some very strenuous objections. We mention this in the light of the session at the recent SAE Summer Meeting which was devoted to the same objective. The difference, of course, is that the art has progressed to the point where certain types of safety tires are considered practically foolproof; also because there are other alternatives that have been suggested. It does show the difference between the action of bureaucrats and industry people.

European Advances

The paper describing automation for the manufacture of the Renault Dauphine car at the SAE Summer Meeting amply confirms the reports of members of the Production Activity a year or so ago. The day is long gone when anyone can assume that our mass production concept is limited to Detroit. When you couple this with lower hourly wages and lower plant and equipment costs you can see why European producers are able to move cars into the USA. There is another big reason. Over in Europe where governments are working with manufacturers to create exports and snag American gold, the producers are given realistic machinery and equipment amortization rates. In short, they make it possible to write off equipment costs within a reasonable time. Here the manufacturers are confronted with ancient BIR regulations based upon World War I equipment life when simple tools were amortized over a period of 20 to 30 years. Something has to be done about these things—and quickly.

Meetings Programs

In recent years technical meetings programs have failed to attract the large attendance that should be expected at regional or national gatherings. To the writer, the basic reason for this lies in the paucity of real news. Much of the content represents a wrap-up of developments already in the works and quite familiar to most people. We realize that part of the problem resides in the fact that manufacturers in our industry never reveal advance information on new programs or products. Nevertheless, there must be areas just outside of this curtain and some of these would draw better attendance.

Truck Control

One of the sessions at the SAE Summer Meeting had seven pa-

(*Turn to page* 82, *please*)

NEW PRODUCTION and PLANT EQUIPMENT

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Pneumatic Grinders

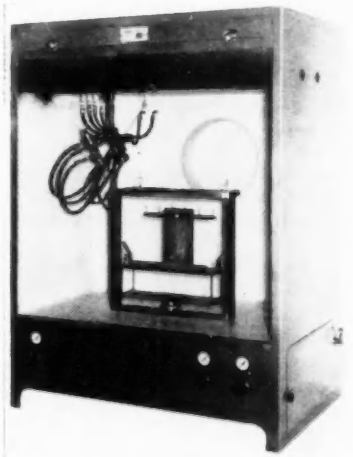
THE 904 series of portable pneumatic grinders includes six in. heavy duty horizontal grinders, wire brushing machines, and horizontal buffers. A choice of three speeds is available in the grinders and wire brushing machines—9000, 7200, or 6000 rpm (free speeds). The choice of speeds for the horizontal buffers is either 9000 or 6000 rpm. Either lever, straight, or grip-type handles may be specified. *Thomas C. Wilson, Inc.*

Circle 30 on postcard for more data

Automatic Spray Machine

AN automatic spray machine which paints one, two, or three surfaces of generally oval or rectangular shaped pieces of varying length, where fine mask definition and paint demarcation are required, has been developed by *Conforming Matrix Corp.*

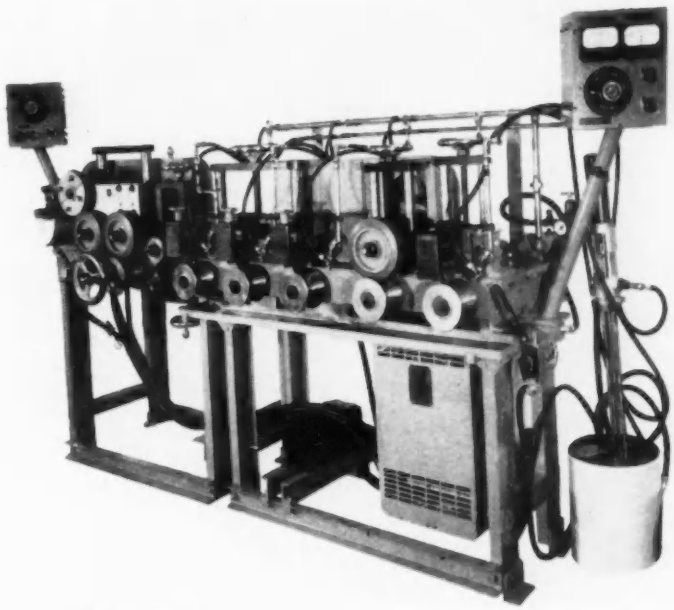
A device which embodies a foreshortened pivoting action permits tilting of the overhead traveling guns in one or two directions as well as painting in both directions when the part is in painting position.



Model SVF automatic spray machine

Standard gun mounting rods may be employed on this single vertical fixture machine, which is named Model SVF. The square shaft vertical fixtures alternately lower and raise the part, placing it snugly in the mask for painting. The fixtures are adjustable so as to paint a wide range of different sized parts.

Circle 32 on postcard for more data



Matthews surface conditioner bar and tube marker handles stock from 1/4 to 6 in.

High Speed Surface Conditioner Bar & Tube Marker

THE *Jas. H. Matthews & Co.* has introduced a combination surface-conditioner bar and tube marker to prepare tubing, bearing residual drawing compound and greasy surface materials, for acceptance of offset printed marking, together with indented marking.

As the material to be marked enters the power driven guide rolls, a series of solvent bearing spray nozzles and adjustable squeegees remove any compound from the tube surface, which would affect the quality of the subsequent marking.

The unit is adjustable for bar and tube sizes from ¼ to 6 in and is adjustable for marking speeds from 125 to 1000 fpm.

Circle 31 on postcard for more data

Bore and Groove Gage

DIAMETER of grooves, bores, counterbores, recesses and hard-to-reach bores can quickly and accurately be determined by use of a new direct reading deep bore gage announced by the *Mueller Gages Co., Div. of Mueller Laboratory.*

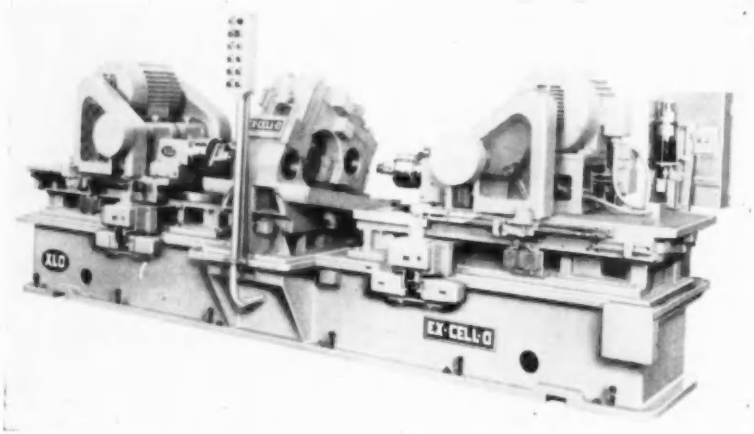
It is offered in three sizes to suit requirements of various hole depths and diameters. The range covers holes between 1⅝ to 10 in. diameters and up to 10 in. deep. The gage is equipped with 0.0005 in. dial indicators mounted in the body and the construction insures long-life reliability. Trigger action eliminates human error because the gage is manually released and spring set to the position of measurement.

Circle 33 on postcard for more data

Ram Turret Milling Machine Features Dial Spindle Speeds

Spindle speeds are infinitely adjustable within a practical range by turning a dial on this new Ex-Cell-O milling machine. There is no need to change belts to obtain desired speeds—merely set the dial for the speed required. The milling head pivots in planes both parallel to the work table and at right angles to it. Power feed to the spindle is standard equipment, with three speeds available in both directions. The power feed can be disengaged when not required. A ram turret supports the milling head and a manually operated pinion and rack provide lateral positioning of the head. (Ex-Cell-O Corp.)

Circle 34 on postcard for more data



Ex-Cell-O custom machine performs rough and finish bores on heavy-duty track rollers

Machine Performs Rough and Finish Bores

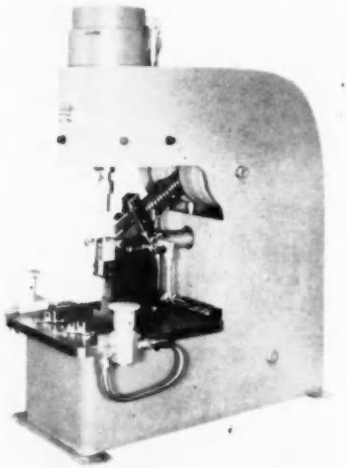
THIS Ex-Cell-O custom machine performs heavy rough boring and plunge facing plus precision finish boring and facing in one machine cycle. Parts are large cast-iron rollers, components of track assemblies for heavy duty crawler tractors.

In operation, the part is loaded in the hydraulically operated fixture and indexed to the rear of the machine. Here the part becomes aligned with the rough boring spindles and roughing operations are performed on both ends of the part simultaneously. At the end of the stroke, both slides retract and the fixture indexes toward the front, ready for finish machining. Both slides again advance and finish boring and facing are performed. After the finish stroke, the slides retract and the fixture is unclamped for the next cycle. *Ex-Cell-O Corp.*

Circle 35 on postcard for more data

Parts Feeder, Driver

THE advantages of automatic feeding of small production parts and the convenience of a bench type driver are combined in the Hopperal driver. The Hopperal small parts feeder has been built into the driver frame and provides a continuous supply of parts for the assembly operation without over-feeding and back pressure. The



Hopperal driver for small parts

unit will feed screws, nuts, bolts, rivets, nails and many other fastening devices. It selectively orients the parts in the inner track and feeds these parts to the outer track for use in the assembly operation. *Haberstump-Harris, Inc.*

Circle 36 on postcard for more data

Foam Mixing Head

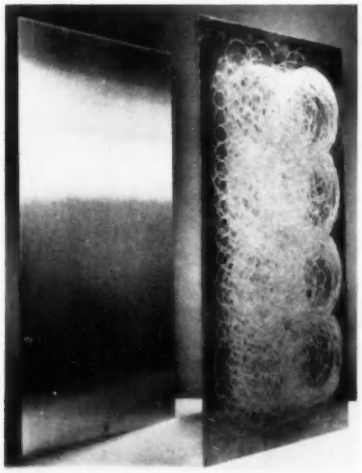
A MIXING head for valving, mixing, and dispensing polyurethane foams has been designed by *The Martin Sweets Co., Inc.* A rod-type valve having teflon seals controls two or three material streams for sharp cut-off operation. The head is designed for continuous recirculation of chemical components when mixing is not taking place. This principle is said to allow for pressure balance of the mix and recirculate cycles, producing accurately proportioned components throughout the entire foaming cycle.

Circle 37 on postcard for more data

Abrasive Belt Grinder

PICTURED are aluminum plates used as die back-up plates in punching out disks of fibrous material. The plates are shifted frequently to provide an unmarred surface for the die, but eventually their surface becomes deeply scored, making them useless. Rather than scrap the plates, belt-grinding was tried.

The sheets are now supported on Masonite and run through a pinch-roll grinder against an X-weight cloth belt to which 36-grit silicon carbide abrasive is bonded with resin over glue. The belt is run over a 65 Durometer contact roll with 35 degree serrations ¼ in. wide and lands 1¼ in. wide. Belt speed is 3900 sfmp, feed speed is 30 fpm. This roughing operation is followed by two passes with a 120-grit aluminum oxide closed coat



Aluminum plate re-finished by Behr-Manning coated abrasive belt

paper belt of E weight, sprayed lightly with mineral oil. The resulting finish is said to be at least equal to the original. *Behr-Manning Co., a Div. of the Norton Co.*

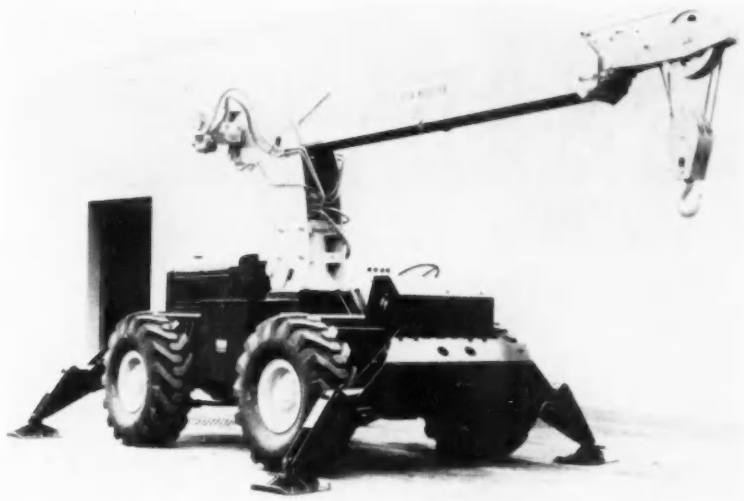
Circle 38 on postcard for more data

Hardness Testers

MODEL H5 Wallace dead load micro-hardness tester for rubber, rubber-like materials, and plastics is said to eliminate the need to mold standard size test specimens and permits the hardness of small parts, sheets, and irregular shapes to be measured directly.

The depth of indentation is measured electronically. The basic machine consists of an indentor and a means of applying a minor and then a major load. *Testing Machines, Inc.*

Circle 39 on postcard for more data



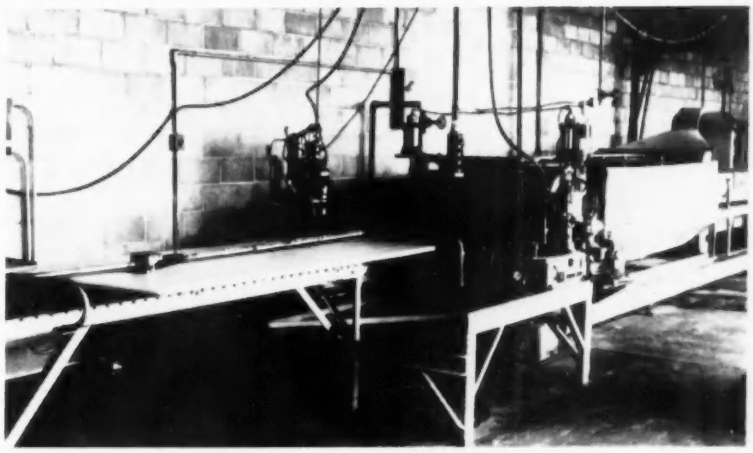
Austin-Western Model 410 features telescoping boom, complete hydraulic controls

Mobile Hydraulic Crane Operates in 10-Ton Range

THE *Model* 410 is a mobile, self-propelled hydraulic crane which operates in the 10-ton range. It has a telescoping, hydraulically operated boom which extends horizontally to 25 ft, retracts to 15, and swings through full circles without limit stops. It also tilts upward to 60 degrees from horizontal.

Manual boom extensions, cabs and other accessories are available. The self-propelled chassis features front-and-rear end steering and torque converter drive. Hydraulically operated outriggers are optional. *Austin-Western Works of Baldwin-Lima-Hamilton Corp.*

Circle 40 on postcard for more data



Westinghouse continuous polyethylene plate extruder

Continuous Polyethylene Plate Extruder

EQUIPMENT for the automatic, uninterrupted extrusion of 48 in. polyethylene plate in thickness up to 1⅛ in. has been designed and built by Westinghouse.

In providing sheet polyethylene, this extrusion equipment will aid the further development of nuclear reactors, since polyethylene can be used where the excessive weight of concrete limits its shielding application. Polyethylene plate exhibits excellent neutron shielding capacity and is used for neutron shielding protection on nuclear reactors where weight and space limitations are a primary consideration. *Westinghouse Electric Corp., Micarta Div.*

Circle 41 on postcard for more data

(*Turn to page* 69, *please*)

News of the MACHINERY INDUSTRIES

By Charles A. Weinert

New Tape-Controlled Positioning Table Has a Locating Accuracy of 0.001 in. and a Repeatability Within 0.0005 in. when Handling Large Workpieces Weighing up to 10,000 lb

New Positioning Table Handles Heavy Workpieces

The latest in tape-controlled positioning tables has a workpiece capacity of 10,000 lb and an overall size of 38 by 50 in. Built by the Cincinnati Bickford Div. of Giddings & Lewis Machine Tool Co., its unveiling took place at a recent press conference held in the company's Cincinnati plant.

The new numerical positioning system, operated either by standard punched tape or a manual keyboard, is designed to position the work for drilling, reaming, boring, tapping or layout at accuracies to within 0.001 in. and with repetitive accuracies to within 0.0005 in. Developed specifically for the application, the control system was designed by Concord Controls, Inc. and G&L's Cincinnati Bickford Div.

The 38- by 50-in. overall table has a travel of 32 by 44 in. It is mounted on roller bearings and hardened ways; and is actuated by electric motors through ball screw drives. There are rapid traverse and servo motors for each axis. When the table approaches its predetermined location, the rapid traverse (360 ipm) motors are disengaged from their ball screw drives and the servo motors are engaged for final positioning at a speed of 20 ipm.

In operation, the machine operator first clamps the work to the table in the usual manner. He then inserts the tape in the transport at the front of the control console; snaps the mode, or cycle, switch to the 'manual' position; and turns on the power.

In this 'manual' mode, the operator sets the control circuits, by means of pushbuttons, to the setup position. Next, he changes the switch to 'setup' mode and brings the table to that same setup position. Rotating the switch to its third position, marked 'tape', locks the table and circuits. The operator then presses the start button and follows his manuscript as the tape automatically guides the table in the complete machining cycle.

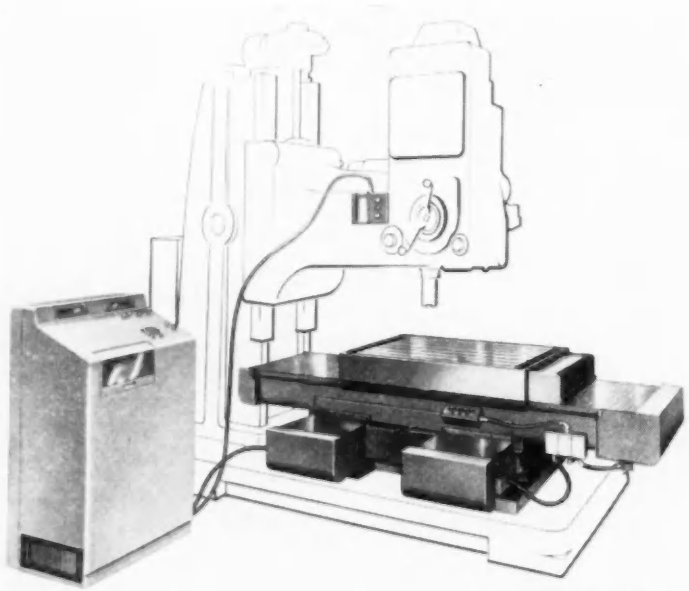
A numerical readout is given to the operator by indicators located on the console, enabling the operator to verify visually each position as it is reached. Additions to, or changes in, the program can be made. The operator in such cases merely switches to the 'manual' mode and punches appropriate pushbuttons on the 10-digit console keyboard.

Several interesting comments were made at the conference. Apparently Bickford, through its Concord Controls, Inc., has entered the electronics business and "will produce controls which are not available in the general market." It was predicted that 10 per cent of sales in the current year will be numerically-controlled equipment, and that within five to 10 years this sector will rise to 50 per cent or better. Diemaking, for example, is expected to go mostly numerical within 10 years, according to G&L officials.

Around the Industry

Van Norman Machine Co.—has been formed, representing the consolidation of Van Norman Machine Tool Co. and Van Norman Automotive Equipment divisions of Van Norman Industries into one firm. The new company will

(*Turn to page 84, please*)



New two-axis tape controlled positioning table, developed by Cincinnati Bickford Div. of Giddings & Lewis Machine Tool Co., has a workpiece capacity of 10,000 lb and rapid-traverse positioning speed of 360 ipm. The control is operated by punched paper tapes read by a standard reader having mechanical feelers.

NEW PRODUCTS
AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Aircraft Battery

Based on the development of a one-piece battery construction with complete resistance to the effects of severe service abuse, the Rebat Executive aircraft battery is available for nearly all single and light-twin engine aircraft.

Engineering features of the Rebat battery include a one-piece cover

bonded to the case for maximum strength; a permanent seal that prevents acid leaks and resultant corrosion; a special Executive Bonding resin that anchors power-producing plates and separators to prevent their destruction by vibration and a permanent intercell bond that isolates each cell and maintains high starting voltage.

Circle 80 on postcard for more data

Three-Circuit Switch

The R. B. Denison Mfg. Co. has developed a three-circuit limit switch that permits many unusual circuit arrangements. Some applications for the device include: in safety interlock systems to tie together two or three functions without the need for an additional relay; and to control a motor and simultaneously start or stop a timer or other control.

Denison Loxswitch three-pole switches are made in two models—the L100WTR for clockwise operation with two normally open and one normally closed circuits, and the Model L100WTL for counterclockwise operation with two normally open and one normally closed circuits. Both switches are readily reversible to give one normally open and two normally closed circuits and have a ¾ in. conduit opening to allow ample room for wires.

Circle 81 on postcard for more data

Vinyl Material

The *B. F. Goodrich Chemical Co., a Div. of The B. F. Goodrich Co.* offers vinyl skin for application in automobile dash boards, sun visors, protruding arm rests, etc. The vinyl is used with urethane foam to form a padding for these and other items to increase passenger safety by eliminating hard and dangerous surfaces.

The vinyl skin is tough and abrasion resistant. In addition, it will take color well for matching various automobile interiors.

Circle 82 on postcard for more data

Power Take-Off

A new power take-off for high-energy, high speed applications has been announced by *Twin Disc Clutch Co.* Designated Model IBF-214P, this unit is said to offer three distinct features—it withstands high-energy heat loads, it can be applied to high-speed engines up to 3380 input rpm, and it operates up to six months between lubrication periods.

The new device is said to overcome problems caused by too-heavy starting loads by means of a ventilated center plate. This plate is designed in two sections with diagonal ribs cast into each section. Placed back-to-back, the ribs cross each other to form only small diamond shaped contact areas, permitting air flow to dissipate excess heat.

A special clutch engagement mechanism cuts throw-out collar wear. There is no contact between the cam followers and the sliding clutch sleeve except when the clutch is being engaged or disengaged.

Circle 83 on postcard for more data

Solenoid Valves

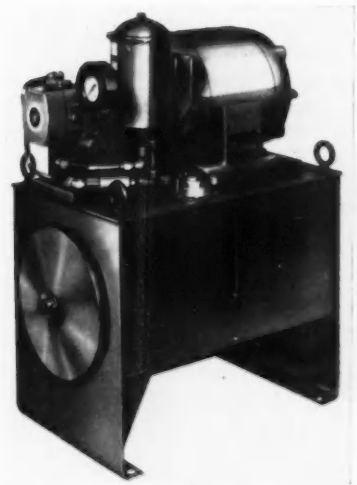
A series of three-way, high-flow solenoid valves for general industrial use is designed to control such media as oil, air, water, and petroleum oils. They are compact, light, mount in any position directly to the line, and operate on a pressure differential of 5 to 150 psi. They are available in ⅜, ½, and ¾ in. full effective orifice sizes, normally open, normally closed, and with directional control in standard and explosion-proof construction. *Skinner Electric Valve Div.*

Circle 84 on postcard for more data

Hydraulic Power Package

The T10 ten gallon power package will provide hydraulic power and control for a wide variety of industrial machinery applications requiring low hydraulic horsepower. These applications include gaging, transferring, rollover, elevating, chuck and clutch operations, etc.

The basic 10 gal reservoir covers a floor area of 25 by 14 in. It is



regularly equipped with clean out covers, fluid level indicators, combination breather and filler, removable baffle and bottom drain plug. *Vickers, Inc.*

Circle 85 on postcard for more data

Servoactuators

Series 17 servoactuators are integrated hydraulic packages which typically include Moog's electrohydraulic servovalve, a cylinder-piston assembly and an electrical feedback device. These units are designed for specific system applications and may include special auxiliary devices such as pressure limiters, snubbers, flow limiters, piston locks, solenoids and/or integral filters to simplify systems installations. Typical models are operable to 350 F, special models can be designed for hydraulic control up to 600 F. They are being produced for specific applications such as flight surface position controls, rocket engine gimballing controls, etc. *MOOG Servocontrols, Inc.*

Circle 86 on postcard for more data

Breakaway Clamps

Made in stainless steel, quick-disconnect breakaway clamps adaptable to remote actuation have been developed by the *Awica Clamp Div. of Poly Industries, Inc.*

The clamps are used largely to connect tubes carrying fuels and liquids between stages of missiles and between airplane wings and jettisonable wing-tip tanks. The clamps are ¾ in. wide and are made in diameters from 2½ to 6 in. and are unaffected by ambient temperatures. They are equipped with a hole for attaching a lanyard which, in turn, can be activated by a solenoid or an electronic device.

Circle 87 on postcard for more data

Automatic Shaft Seals

Designed for all types of equipment—automotive, industrial, and machine tools—"Aqua-Tite" automatic shaft seals feature simplicity of design and trouble-free service.

Pictured is the Hy Duty J-2 seal which has a large driving area carbon washer to prevent excessive wear due to torsional vibration. The low compression spring, contained in a brass retainer cup, prevents the rubber housing from being cut by the spring when excessive cavitation develops in the pump. *Schwitzer Corp.*

Circle 88 on postcard for more data

Fluid, Gas Filters

High pressure filters capable of operating at pressures to 1000 psi and temperatures to 275 F have been

introduced by *Purolator Products, Inc.* Designated the P-192 series, the filters are designed for use in pneumatic and hydraulic systems and provide effective filtration for such fluids as lubricating oils, ethylene glycol mixtures, hydraulic fluids, fuel and oils, plus air and gases.

Relief valve settings vary from 15 to 20 psi for lower differential pressures to 45 to 55 psi for higher pressures. For suction side installations, 4 to 6 psi settings are available.

Circle 89 on postcard for more data

Dripproof Motors

The Lima Electric Motor Co., Inc. has announced a line of dripproof electric motors in new NEMA rerated frame sizes, from ½ hp at 9000 rpm through 150 hp at 3600 rpm.

The frames are rigid, seasoned, cast iron with integrally cast feet. The cast iron endbells have precision machined registers and bearing fits. Deep-drawn baffle plates in the endbells provide extra protection for the winding. Connection boxes can be rotated to make connecting easier.

Circle 90 on postcard for more data

Light Weight Motor

Model D-3910 light weight motor, with a rectangular frame for operation on d-c power sources, is available from *The Hoover Electric Co.* Several features of the new motor include 0.50 hp at 12,500 rpm continuous duty, 1.0 hp at 9000 rpm intermittent duty, 28 volt d-c, patented brush holder that permits even brush pressure, low radio noise interference and high reliability.

The unit is adaptable to a wide range of aircraft, missile, and industrial applications requiring a lightweight motor such as pumps, compressors, gear boxes, etc.

Circle 91 on postcard for more data

Voltage Regulators

A line of voltage regulators for aircraft d-c generators is now in production by the *Electronics Div. of Hydro-Aire, Div. of Crane Co.*

The completely transistorized units have an operational life of up to 10,000 hours, according to the company. They have no moving parts and do not require shock mounting.

Easily adjustable, the units can be set to any value between 26 and 30 volts in increments of 0.05 volts.

Circle 92 on postcard for more data

Finishing Compound

A new abrasive barrel finishing compound has been announced by *The ESBEC Barrel Finishing Corp.* Named No. 680, the compound combines fast cutting action with fine surface refinement and cleanliness of surface on most metals, including steel, stainless steel, copper, brass, and aluminum. During the first two to five hours, depending upon such elements as mass height, speed, etc., it cuts fast and reduces cutting cycle time. At the end of the cutting action, the abrasives in the compound break down and become polishing agents. When completely broken down, it can easily be rinsed from the load.

Circle 93 on postcard for more data

Low Profile Tires

United States Rubber Co. has developed three new tires featuring the low profile principle of tire construction. These tires are oval in cross section—wider than they are high—which is said to make the tires smooth riding, cool running, and stable on curves.

Circle 94 on postcard for more data

METALS

Steel Strike Finds Consumers Generally with Adequate Inventories. Zinc Deliveries in June at All-Time High

By William F. Boericke

The start of the steel strike found most users with adequate inventories to withstand a production shutdown of 8 to 12 weeks. No definite figures are available on how much steel was in the hands of the consumers, but most of them took advantage of the two-week extension to acquire steel that otherwise could not have been delivered by the deadline originally set. No doubt some buyers had ordered excess steel in the second quarter to build up stocks. Warehouses will supply needs for some time for those unable to get promised delivery. Shortages are likely only in specialty products. Steel service centers expect excellent business, although even under normal conditions the summer months are a relatively dull period in the industry. Even before the start of the strike, there was evidence of a midyear lag in orders, particularly noticeable in lower demand for oil country goods.

Estimates run to 21 million tons of steel inventories in consumers' yards on July 15. This would be about 4 million tons less than at the start of the 1956 strike, but inventories this year are believed to be in better balance. Products in strongest demand are galvanized sheets and plates. Tin plate was wanted badly before the work stoppage, with requests for immediate delivery of the September scheduled tonnage. The automobile manufacturers are believed to possess adequate supplies for their needs. Demand for flat rolled products is expected to remain firm for the rest of the year.

Lower Output Seen in Second Half of Year

Even without the strike, steel production in the second half of the year would probably have been less than the torrid first half, which saw an output of some 64 million tons. An Inland Steel executive predicts 51 to 53 million tons for the second six months, and an operating rate of about 75 per cent capacity.

The scrap market strengthend before the strike, with the composite price up to $38 a ton, the highest since March. Heavy export demand strengthened its position. However, it appears doubtful demand will hold if the strike continues for any length of time.

The strike will shut down production at domestic iron mines but won't completely affect output from foreign mines owned by U. S. steel companies, who are able to ship a good part of their ore abroad to foreign customers, or stockpile the ore locally.

Copper Figures for June Surprisingly Good

June figures from the Copper Institute were surprisingly good contrary to what pessimists had been predicting. Domestic deliveries hit the amazing total of 151,000 tons for the month, or a daily average of over 5000 tons. Deliveries abroad were likewise the highest for any month this year. As a consequence the world statistical position was dramatically reversed. Deliveries to fabricators exceeded refined copper output for the first time since November, by 10,700 tons, and refined stocks were reduced by 6000 tons, after climbing steadily for seven months.

However, it would appear that the high rate of deliveries in June was in considerable part due to heavy inventory buying in anticipation of a strike at the copper mines. While stocks were reduced it is a moot question if producers had not transferred much of them into fabricators' hands. Business in the first half of July was distinctly at a lower pitch than in June, reflecting in part seasonal influences as the mines and fabricating plants prepared for usual vacation periods.

Producers and Smelters Cut Price

The highly erratic copper market put on a confusing show in July. Apparent weakness in demand, fear of overproduction of copper, and steady decline on the London market for both spot and forward metal, caused the smelters to reduce their price with distressing regularity, from 32½ cents to 29 cents a pound in less than a month. The final cut sparked the first reduction in the producers' price of 31½ cents, held unchanged since March, to 30 cents. It was first announced by Phelps Dodge, quickly followed by the others of the Big Three.

Phelps Dodge to Reduce Production

Accompanying the price reduction, Phelps Dodge made the highly significant decision to reduce its copper output by 7 per cent, or about 1600 tons a month. This was enough to reverse the downtrend in London and on the volatile Commodity Exchange, where copper futures zoomed up as violently as they had previously fallen. Whether other producers will follow suit remains to be seen, but it is a step in the right

(*Turn to page* 68, *please*)

direction, and cuts to the root of the difficulties that have plagued the industry.

According to a Government estimate, domestic copper consumption in 1959 will show a 15-20 per cent gain over 1958, or close to the record figures of 1955-56.

Zinc Statistics Excellent

There can be no argument that the June figures for zinc were inspiring. They show the metal to be in the best statistical position it has held for two years. Briefly summarized, shipments were up 17,000 tons over May and totaled 102,162. Deliveries to domestic consumers were nearly 100,000 tons. This amounted to an all-time record. At the same time, stocks of slab were reduced to 169,400 tons, which represents a cut of 36,600 tons since April, and is the lowest figure since 1957.

Particularly interesting was the decline in stocks of Special High Grade, reflecting a tight supply situation arising from increased demand from the diecasters. The galvanizers, as usual, continued their heavy call for zinc, in line with the pattern since the first of the year.

Galvanizers' Demand to Be Cut by Steel Strike

It is reasonably certain that zinc would be selling higher today if the shadow of a steel strike had not overhung the market, in which event buying from the galvanizers would promptly dry up until its termination. While there was no indication that any of the leading producers or smelters would venture an increase at this time, accordingly most sales continue at a flat price, suggesting that buyers believe prices are much more likely to rise than to fall in spite of some undoubted inventory buying the last month.

Higher Price Seen Later

In London zinc continues to sell at the equivalent of 10 cents a pound, which would require about 12 cents here to make it profitable to export, after paying tariff, insurance, and freight. Another bullish factor for expecting a better zinc price is the likelihood of a higher aluminum price following wage negotiations. As aluminum competes with zinc in diecasting, it would follow that zinc's position would improve with any price rise in aluminum. Finally, it appears incongruous that lead should sell higher than zinc in New York, while the contrary is true in London.

Domestic Lead Sales Good, Foreign Dull

Lead continues in good demand in this country, but the high rate here hasn't been paralleled abroad. Domestic shipments in May were the highest for any month since the War. In consequence, stocks dropped 35,600 tons and were at the lowest level for a year. On the other hand, stocks ex-U. S. were slightly higher at the end of May than a month earlier, and were still above stocks a year ago.

Representatives of industry and labor called on Congress to revise quotas downward to limit imports further. A 15½ cent price was asked to keep up domestic lead production, as well as a tariff on manufactured lead products which are now imported outside of the quota on metal and ores. Nevertheless, it appears that the quotas have been helpful in limiting imports of foreign ore, which declined in May about 11,000 tons compared to a year ago.

Aluminum Shipments, Production, Increase

The aluminum industry continues to zoom ahead. June shipments exceeded production, which has increased from 71 to 85 per cent of primary capacity, presently 2,303,000 tons. While no doubt some of the heavy buying has been to build up inventories in anticipation of a price rise that is likely to follow conclusion of the wage negotiations, most of the demand has been for definite immediate consumption.

Reynolds Metals tapped its first metal at Massena after two years construction work, adding 33,000 tons to the company's primary capacity of 634,000 tons. It now reports operating at 100 per cent capacity. By the end of 1959, it will have added another 67,000 tons. General Motors will build a 35,000 ton foundry to produce aluminum castings for automotive operations. This will bring total production at the Massena area, including Alcoa, to over 250,000 tons, or 11 per cent of the total domestic aluminum capacity.

Not to be outdone, Kaiser brought in another potline at Meade, and reports 90 per cent operating rate. Anaconda will up from 75 to 88 per cent. A $15 million order for aluminum freight cars was given by Southern RR which represents this country's first large order for aluminum rolling stock. Quite as dramatic was announcement by National Lead of its intention to die cast V-8 aluminum engine blocks.

Price Increase to Follow Wage Settlement

Aluminum executives are a unit in declaring higher prices are needed if wages are advanced. The end of price stabilization on June 20 as guaranteed early in the year by the producers would permit an increased price immediately, but this will undoubtedly be delayed until the wage settlement is known. It appears likely that about 1.3 cents per pound will be posted, which would restore the full amount of the 2 cent cut that was made a year ago last April.

More than a modest increase is not expected. Aluminum prices are still soft abroad, about 2 cents under the domestic market. Russian aluminum has been reported to have been offered in larger amounts on the Continent. And, in spite of the excellent domestic sales record, there is still considerable unused capacity with more coming in. Nevertheless, in contrast with the unsettled situation in copper, the aluminum industry is looking to the future with undisputed confidence. ■

(*Continued from page* 63)

Honing Machine

A NEWLY designed version of the Model 10 honing machine is being introduced by the *Barnes Drill Co.* for manual or automatic honing of bores from ¼ to 1½ in. in diameter. The control panel of the new model has been raised to a more readable position, the front of the cabinet is fully enclosed, and the head has received a new styling treatment.

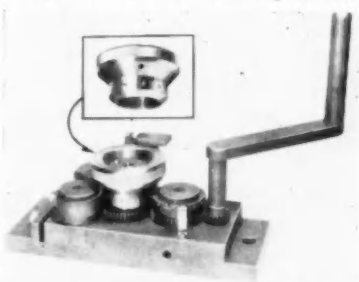
The model is available with an air-operated six station rotary indexing fixture, and can be furnished with a variety of automatic equipment including magazine loading, automatic ejection, pre-gaging, post gaging, automatic shut-off and stone replacement, and sorting. Positioning of index stations to the honing position is controlled by two limit switches, and simplicity of fixturing permits economical changeover to different sized parts.

Circle 42 on postcard for more data

Marking Fixture

A MARKING fixture for stamping equally spaced numbers or figures around the circumference of metal parts has been developed by the *M. E. Cunningham Co.*

The fixture can be adapted for



Model GRD-950-1A marking and stamping fixture

graduation marking where close tolerance is not required.

Named the Model GRD-950-1A, the fixture is composed of three main components—a circular marking die, a mandrel for holding the part being marked, and an operator's handle. These units are geared together to provide synchronized rotation of the part and the marking roll.

Circle 43 on postcard for more data

Roller Levelers

ROLLER levelers for precision flattening and correcting ferrous and non-ferrous sheets and strip, including tension leveling of coil stock are available from *Sutton Engineering Co.* All sizes are available for all modern metals of any required width and in gages from 0.001 to 0.750 in.

Circle 45 on postcard for more data

Snyder five-station machine mills, drills, countersinks, spotfaces, and taps

Five-Station Rotary Index Machine

THIS special Snyder five-station rotary index machine mills, drills, countersinks, spotfaces and taps the carburetor pads in three different truck engine intake manifolds. It produces at a rate of 109 pieces per hour at 100 per cent efficiency.

To handle this variety of parts, three different design methods have been applied. These include: 1. A two-position drill unit with two-position single spindle drill head, 2. Interchangeable pot heads and 3. A two-spindle tap head with one of the spindles used at a time for a part.

The machine is made up of an assembly of standardized modular compartments including a 60 in. diameter table with a fluid drive index mechanism, wing bases, vertical columns, way-type slide units, milling heads, drill heads and tapping heads with lead screw drives. A separate motorized unit provides power for the hydraulically operated, electrically-controlled machine, equipped with a push-button control panel. *Snyder Corp.*

Circle 44 on postcard for more data

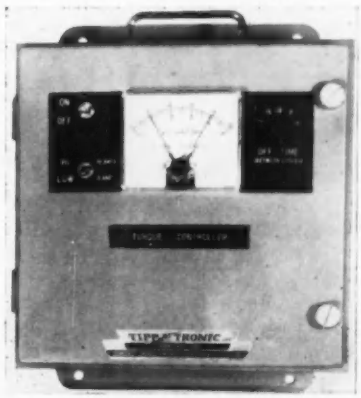
Torque Control

THE TippTronic torque control makes accurate torque force measurements, automatically, shutting off power equipment at the optimum point.

It can be used to prevent damage to tools or bits in working with hard alloys, to assure proper degree of tightening in mechanical "run-up" in precision nut and bolt assembly, and to act as an alarm in automatic production processes in which torque is produced by electric motor drives.

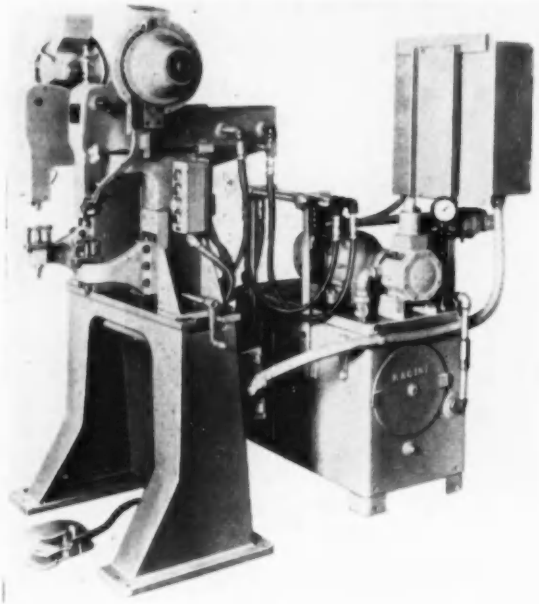
The control utilizes the current drawn by the motor drive as the measurement factor, with automatic shut-off at a point slightly above the normal work load. *TippTronic, Inc.*

Circle 46 on postcard for more data



TippTronic electro-mechanical torque control

Dual Riveter Uses Hydraulic Power



The Model HDR hydraulic dual Riveter uses hydraulic power as the motivating force and can be adapted to a wide range of setup requirements. It is complete with all hydraulic and electrical equipment and controls, and can effectively speed up production line or unit machine riveting jobs. The HDR is tooled to use and set two 1/4 in. steel rivets gravity fed from two hoppers. Operating cycle is about eight tenths of a second at 420 psi oil pressure when setting two 1/4 in. rivets and has the machine maximum operating pressure of 1000 psi. (The Tomkins-Johnson Co.)

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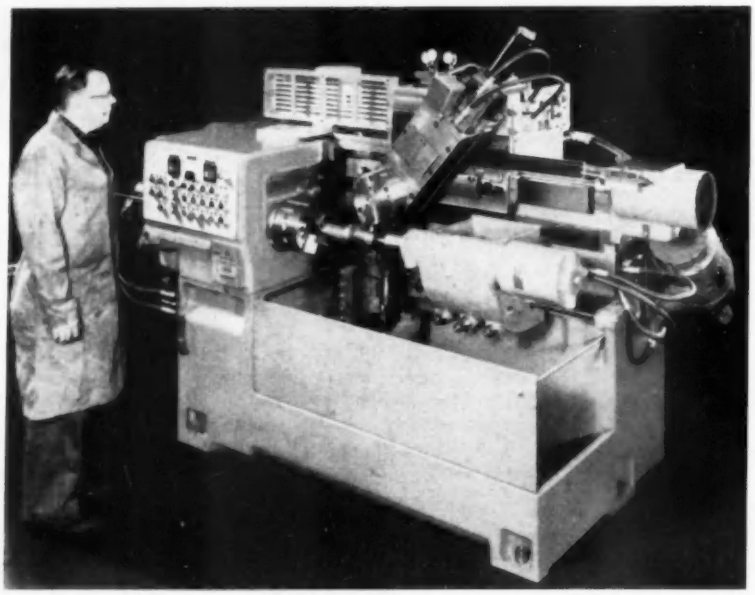

Sundstrand Model 14T-25 Multi-Cycle hydraulic tracer lathe

25 Hp Multi-Cycle Hydraulic Tracer Lathe

A NEW 25 hp Multi-Cycle hydraulic tracer lathe that permits three roughing and a finish turning cut to be made from the same template is announced by *Sundstrand Machine Tool, Div. of Sundstrand Corp.* The stylus and cutting tool are closely coupled to reduce the possibility of deflection and other errors.

To simplify setup and insure maximum accuracy, graduated scales are provided for dog setting, template positioning, tailstock positioning, and crossfacing slide location. Dial indicators at the top of the tracing carriage permit accurate depth setting of the first three cuts. After the three roughing cuts are taken, the tool turret indexes for the finishing cycle with a 0.020 in. depth of cut.

This arrangement makes it practical to use carbides for the first three cuts and finish the job with ceramic tools, if desired. The machine is designed with the rigidity and speed required for maximum utilization of ceramic tooling.

Circle 48 on postcard for more data

SHORTIES

A new cutting machine can chew its way through 3-in. thick aluminum plate at about 15 in. a minute and through half-inch aluminum plate at about 7 ft per minute.

●

In 1952, about 12 per cent of all aircraft industry employes were engineers. Today, about 22 per cent are engineers, and it's estimated that this number will rise to about 28 per cent by 1965.

●

The ratio of weight of the first satellites launched was 10,000 to 1 (10,000 lb of vehicle weight for every pound of satellite); current rocket engines have cut this ratio to 1000 to 1; and future engines will further reduce it to about 200 to 1 for interplanetary missions and as low as 50 to 1 for satellite use.

●

A U. S. international air carrier operating three turbojet transports flew 50,000 passengers across the Atlantic in its first five months of regular flights. Air transport experts estimate that it would require more than a year for three piston-powered transports to handle an equal number of passengers.

●

Blast furnaces in the U. S. produced a record 42,393,666 net tons of pig iron and ferroalloys during the first half of 1959. Previous peak for first-half production was 41.7 million net tons in 1957.

●

Cash dividend payments in the first half of 1959 by firms issuing public reports totaled a record $6 billion—up 3 per cent over first half of 1958.

1959 Technical Report No. 3

Mechanical device relieves overtaxed attention and muscle strain...

primary causes of driver fatigue...

HUMAN engineering scores new gains daily in improving the conformability of machines to the needs of their human operators. Application of this science now gives automobile and truck drivers new freedom from driving fatigue.

Two functions...performed by a simple servomechanism trademarked *Speedostat*...provide this important driver benefit. Both functions are related to the driver's task of regulating vehicle speed.

Under any and all driving conditions the driver has to decide on some acceptable top speed. This limit may be determined from road or traffic conditions, posted speed limits, condition of the vehicle, or simply by how the driver feels.

To maintain the selected speed *without the aid of Speedostat* the driver must refer constantly to the speedometer. As road, traffic and visibility conditions vary, this need to watch the speedometer becomes an annoying and dangerous distraction. *With* Speedostat, the driver simply turns a selector knob to the speed he wants to drive. Pressing the accelerator pedal, he encounters greater than normal resistance at just the point where the vehicle is travelling at the preselected speed. (Unlike devices that flash or buzz only when *over* a selected speed, Speedostat constantly reminds the driver when he is *at* a selected speed.)

Speedostat reduces the demands on the driver's attention...lets him keep his eyes on the road ahead.

Out on the highways and turnpikes, traffic often allows steady driving...and greater fuel economy. To drive steadily *without the aid of Speedostat* the driver must hold his foot at just the right position on the accelerator pedal...setting up a strain on leg muscles, strain that hastens fatigue.

With Speedostat the driver simply sets the selector knob to the speed he wants to drive, brings the vehicle up to that speed and engages the "hold speed" feature of the device. Speedostat will then maintain that constant speed uphill, downhill and on the straightaway...without the driver having to touch the accelerator pedal. Normal operation is restored by the slightest pressure on the brake pedal.

Using Speedostat as a speed reminder or for automatic speed maintenance, the driver keeps full control of the vehicle. There is no interference at all with the acceleration or braking.

Additional information...regarding incorporation of Speedostat in the manufacture of vehicles, and the sales appeal it adds to each vehicle ...is available from the Speedostat Division, Perfect Circle Corporation, Hagerstown, Ind.

PERFECT CIRCLE

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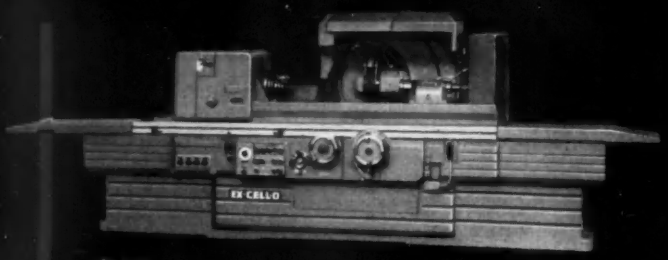

Above:
The Style 36 Precision Thread Grinder used to grind the worm gear shown above is equipped with a standard Three-Way, Cradle-Type Diamond Dresser.

Below:
Huge worm gear, shown during finish grinding, has 10" diameter. Depth of cut is 1⅜", with 170" stock removal. Thread form has included angle of 29°, a triple lead of 6", and a specified pitch diameter of 8.0763".

59-24

A job as tough as grinding this hardened steel worm gear used by a milling machine manufacturer may not be every-day work for an Ex-Cell-O Style 36 Precision Thread Grinder—but it *can* be!

Ex-Cell-O Precision Thread Grinders combine toolroom accuracy with production output. Inbuilt flexibility makes them ideally suited to a wide range of workpiece shapes and sizes, and the popular Styles 36, 50 and 120 can be optionally equipped for precision grinding of internal threads.

Whatever the thread type—single or multiple, right or left-hand, straight or radius forms—there's an Ex-Cell-O O.D., I.D. or universal Precision Thread Grinder with the right capacity, the preferred automatic features, the proper wheel dresser and the *versatility* to suit nearly every need. Write direct for the descriptive catalog, or call your local Ex-Cell-O Representative.

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DETROIT 32, MICHIGAN

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Machinery Division

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ECONOMY AND STRENGTH are outstanding characteristics of these pressure plates for automotive transmissions. These sintered metal parts are another typical result of the effective liaison between Moraine Products and customer in product design. They also confirm Moraine Products' talent for producing—in quantity and on time—parts that can take the punishment of the most demanding operating conditions.

Parts shown ⅓ actual size

Vital parts for Automotive Progress

Moraine Products
Division of General Motors, Dayton, Ohio

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A Dynamic Structural Test Procedure

By Gerald Klaasen
Chrysler Corp.

OUR standard procedure for determining structural dynamics of a car is as follows: The car is elevated on a stand so that two vibrators can be attached near the front end of the frame as shown in Fig. 1. These vibrators can be made to operate either in or out of phase to bend or twist the structure as required. Strain gage type force transducers are placed in the drive rods so that the force input is known at all times. The signals from these transducers are fed into a control box where they are amplified to such an extent that they will produce a direct reading of force on the same meter which is used to read vibration amplitude.

Since we are interested at this stage only in the behavior of the structure, we must take steps to isolate the influence of the engine and the suspension. The engine mountings are, therefore, disconnected from the frame and the engine is supported from the floor by means of jacks. Removal of this weight from the front end of the structure ordinarily would cause the car to rise on its suspension, but it is restrained in its normal attitude by means of a low rate spring which is introduced between the front end of the frame and the stand.

To isolate the suspension, the tires are removed from the wheels and the wheels are allowed to rest solidly on the stand. This raises the suspension frequencies which are usually found in the shake frequency range to a point completely outside this range. At the same time, the structure is softly supported by the chassis springs so that it is relatively free to vibrate in its normal modes.

Bending and twisting resonance curves and run first with the velocity type vibration transducers placed at strategic locations on the structure. The exciting frequency is varied through a frequency range of 7 to 20 cps while the exciting force is held constant. Bending amplitude is read directly in inches on a vibration meter. Two transducers are hooked up so that their voltages add when they are out of phase. They are used to measure twist angle. Typical curves resulting from this procedure are shown in Figs. 2 and 3.

Most troublesome suspension resonances occur in the 8.5 to 13.5 cps range. It is very desirable, therefore, to have structural resonances occur above this range and the farther above the better so that they will be detuned from suspension resonances. The shapes of these curves also tell us about structural damping. If they are high and narrow there is little damping. If they are low and flat there is much.

The foregoing is an abstract of a paper presented by the author at the SAE National Passenger Car and Production Meeting, held in Detroit last March

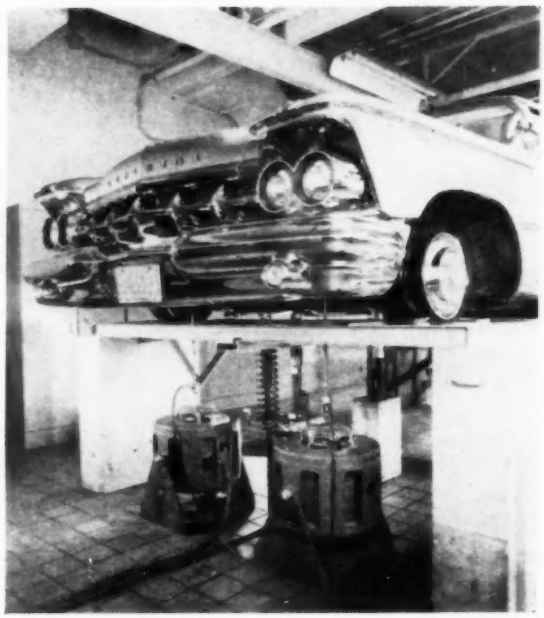

Fig. 1 — Vibrators driving car structure

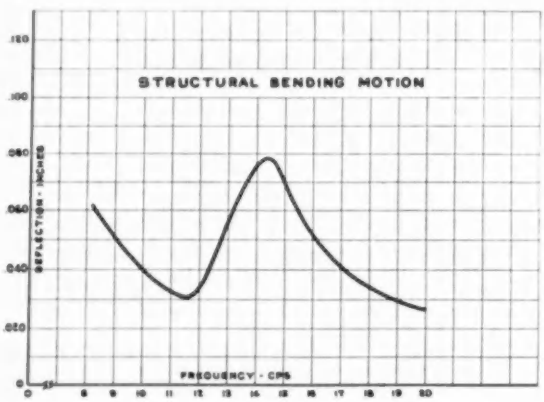

Figure 2

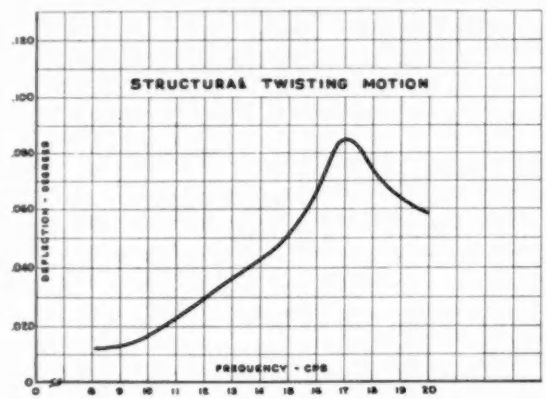

Figure 3

THE ONES THAT WILL LAST (and last, and last!)? THOSE MADE FROM CONTINUOUS PROCESS ZINC-COATED STEEL SHEETS

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The people of the Galvanized Container Industry, always alert to make improvements to keep their products the best, can give you a multitude of reasons why. Chief among them: the continuous process insures a uniformly applied, corrosion-resistant zinc-coating. In fact, the zinc and steel are integrated to form a tight bond for every square inch, a durable coating which stands up to any rigorous stress of the fabrication process.

Continuous process zinc-coating will not chip or flake, no matter how much it is twisted, crimped or lock seamed. It can be worked to the very limits of the steel itself! Your budget benefits because there is no need for additional coating of any kind.

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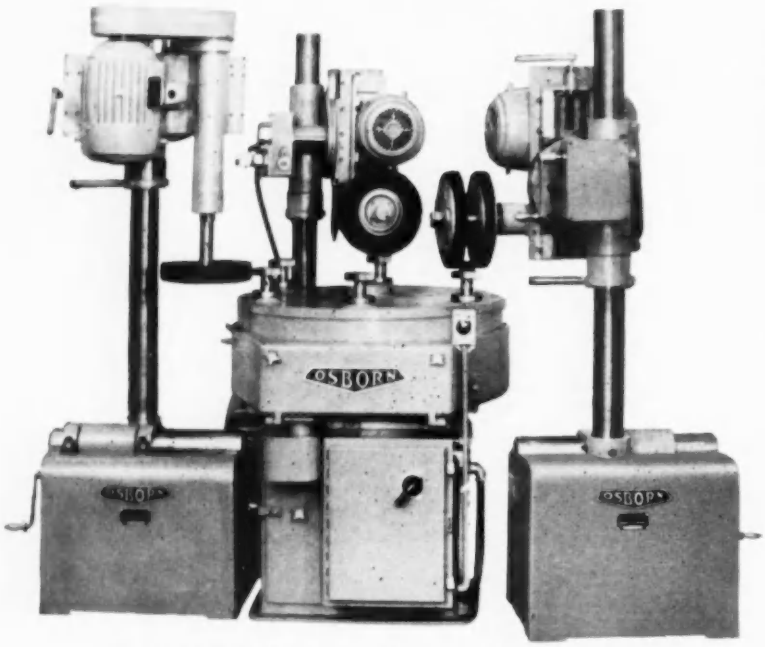

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Most important feature—production men can economically "build" *custom* Brushamatic Machines from *basic "building block"* components . . . brushing heads, index tables and electric controls. Other advanced design and construction features make these new Brushamatic units worth your immediate investigation.

Your Osborn field specialist has latest application data on a wide range of cost-saving finishing methods. And an **O**sborn **B**rushing **A**nalysis→made in your plant—is the first step to pinpoint savings on *your* operations. Write for details. *The Osborn Manufacturing Company, Dept. E-80, Cleveland 14, Ohio.*

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METAL FINISHING MACHINES...AND FINISHING METHODS
POWER, PAINT AND MAINTENANCE BRUSHES
FOUNDRY PRODUCTION MACHINERY

OSBORN®

Detroit Diesel

(*Continued from page* 45)

block all over. Sides and undersides are finished-milled at Station 2. Banks are milled at Station 3, Stations 4 and 5 being idle. The top is milled at Station 6.

The banks have gasket grooves milled in the top surface. Longitudinal grooves are milled at Station 7, cross grooves at Station 10, Stations 8 and 9 being idle. Stations 11 and 12 too are idle. Then both ends are finished-milled at Station 12 and unloaded.

A 5-station Ex-Cell-O precision-boring transfer machine is set up for semi-finish and finish-boring of cylinder bores; counterboring and chamfering the bores. Stations 1 and 2 handle the semi-finish boring, counterboring, and chamfering. Finish-boring and counterboring are done at Stations 3 and 4, holding the bore to 4.6265-4.6275 in.

Inasmuch as these engines are of dry liner design no further operations are required on the bores, i.e., no honing is required.

Final major operation is the counterboring of all water and oil holes in the banks, in a five-station Footburt transfer drilling machine. It has 30 spindles in action for the V-12 block; 23 spindles for the V-8; and 19 spindles for the V-6.

This marks the end of the cylinder block machine line. Blocks proceeds through a large Centri-Spray machine for washing and flushing water jackets, then are fitted with plugs, and finally go to the water test.

Accepted blocks are given a thorough inspection, supplementing the gaging and inspection at various points along the machine line.

Finally it may be observed that this transfer machine line exemplifies the highest achievement in process engineering: the building-in of flexibility in automatic transfer machines capable of encompassing all of the variability inherent in three different cylinder blocks. Only a few years back it would have been necessary to employ either single-purpose machines or separate lines to handle three different cylinder blocks on a mass production basis. ■

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Vacuum Metalizing

(*Continued from page 49*)

from a chrome plated ring die cast part to a metallized phenolic molding for a passenger car dome light housing.

There are numerous interior trim parts which are now chrome-plated or only painted that a vacuum metallized finish could adequately replace. In many instances, steel stampings and die castings could be replaced by vacuum metallized plastic moldings at a considerable savings in material as well as processing and finishing costs. Such substitutions could also yield attractive weight savings. Coating suppliers may well develop coatings so durable that "first surface" metallized finishes can be used for exterior and interior automotive trim parts.

CURRENT TRENDS

There is little doubt that vacuum metallizing is expanding its applications in the automobile industry. The 1959 cars gave ample indications that engineering stylists are designing specifically for the process (see Table I).

For example, there is sustained use of second-surface coated horn buttons and instrument dials, as well as the appearance of the Chevrolet Corvette hub cap medallion. A particularly interesting application is the decorative and functional use of metallized thermoplastic arm rest extensions. Major areas of this part are first-surface metallized to simulate chrome, while second-surface deposited aluminum enhances the reflectivity of other selected areas.

Reports indicate that there has been an unusual amount of interest in vacuum metallizing for the finishing of many parts for the 1960 models. The custom metallizers are known to have bid on a record number of volume jobs. Most of the work is still being done by small parts suppliers, although the automobile manufacturers are getting further into the process. Ford, American Motors, and several divisions of General Motors Corp. are active in the field.

Vacuum metallizing is being evaluated for numerous potential functional, as well as decorative, applications. For example, it has always been possible to vary the thickness of the deposited film over the surface of a complex part in order to control light transmission through the film. This technique shows promise for automotive windshields. The inner layer of plastic or glass could be coated with a thin layer of gold to screen out infrared heat rays but let in visible light. By the same token, it is possible to deposit dual-function coatings that both control light transmission and provide an electrically conductive coating for defrosting of windshields.

Another significant forward step is the development of a vacuum metallizing process that makes possible deposition of thick film coatings of cadmium or aluminum on steel or some aluminum parts. It compares favorably to electroplating with respect to process cost and

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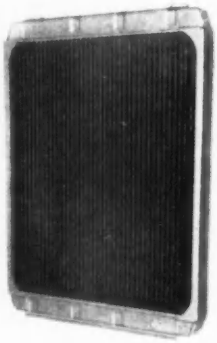

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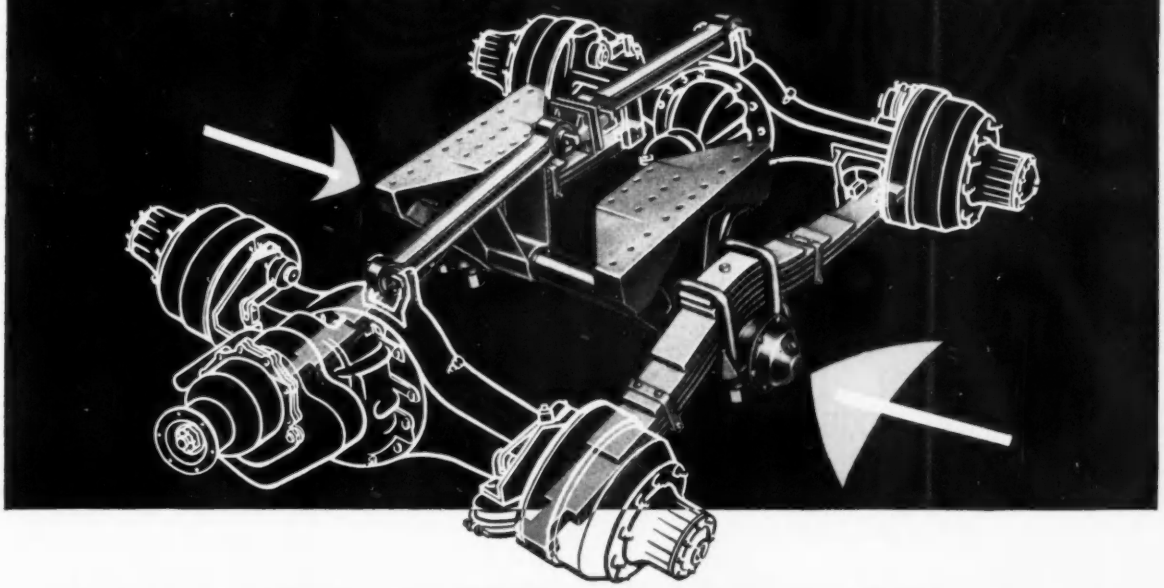

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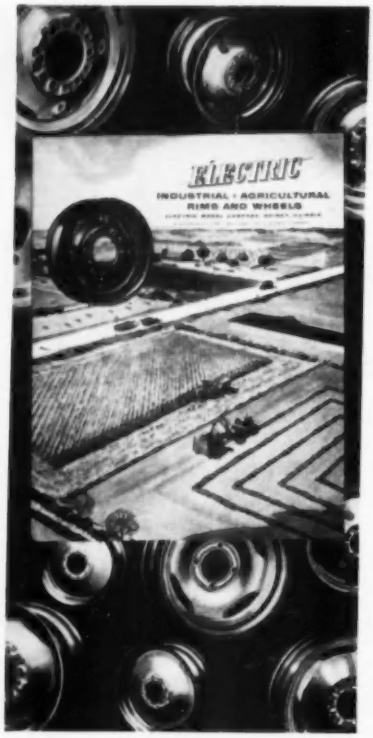

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quality of coating. The process permits the deposit of films several thousandths of an inch thick which not only withstand weathering, but also take various chemical treatments. Aluminum, for example, can be anodized and colored, a decided advantage for automotive trim. So far, parts have been metallized by batch methods only, but it is theoretically possible to operate on a semi-continuous or continuous basis as well.

There are three areas in the automotive field where thick film aluminum coatings are seen as applicable; 1) as an alternative to hot dipped body sheet steel, mufflers, etc.; 2) as a corrosion protective and decorative coating for aluminum die castings and forgings; and 3) as a protective and decorative coating for cheaper stamped or pressed steel parts. A number of automotive parts have already been successfully vacuum metallized with thick coatings; selected samples are pictured.

The foregoing is a brief summary of where vacuum metallizing stands today with relation to the automobile industry and where it will be in the immediate future. There is every reason to believe that its rapid development from laboratory levels to a high-quality production finishing process will be matched by an even more spectacular growth in the years ahead. ■

Acknowledgments

The author wishes to express his appreciation to personnel of the following organizations for supplying material and illustrations for this article:

Consolidated Electrodynamics Corp.
NRC Equipment Corp.
National Research Corp.
F. J. Stokes Corp., Vacuum Equipment Div.
Society of Vacuum Coaters

Deere Assembly Line

(*Continued from page* 41)

and governor and rocker arm assembly is put into place. Fan drive pulley, push rods, and rocker arm cover and gasket and manifold are then added. The water pump, intake and exhaust manifold unit, push rod cover, and thermostat go onto the block next.

At the stations near the end of the assembly line the spark plugs are installed, the fan belt put in place, and the generator-regulator unit, distributor, coil, and ignition harness are assembled to the engine. After addition of the oil filter, fuel pump, fuel line, and oil pressure regulator, the engine leaves the assembly line and goes to the test area. A dynamometer run-in for 40 min., including 5 min. at 900 rpm, 25 min. at 1800 rpm, at the equivalent of full load, and a final 10 min. at variable loads, is standard procedure.

The engine is then inspected to make certain it meets customers specifications. The rear housing is added, breather cap and starter installed, and the engine goes to the paint booths.

The entire assembly line, exclusive of the test area, is about 75 ft long. The engines never leave the hangers on the monorail conveyor from the first station until they are thru the paint oven. In addition to the bins at one side of the conveyor, tables are provided at several places along the opposite side, so that tools, oil baths, repair parts, and other items can be conveniently placed. ■

Chemicals and Cars

(*Continued from page* 40)

rosion. Of vital concern is the effect of hard waters upon the corrosion rate of aluminum. Dow corrosion engineers are constantly evaluating inhibitor systems with various aluminum alloys and types of hard waters. Several promising formulations are now available which will adequately protect the aluminum engine against corrosion.

By way of an interesting sidelight, Dow is considering the promotion of its own brand of antifreeze under the Dow name. A Dow-brand anti-freeze will be test marketed this Fall in selected areas. While the company has been in the past an important producer of antifreeze, it has never before marketed anti-freeze under its own name. Rather, its product has been sold under private label. Dow will continue this part of its program.

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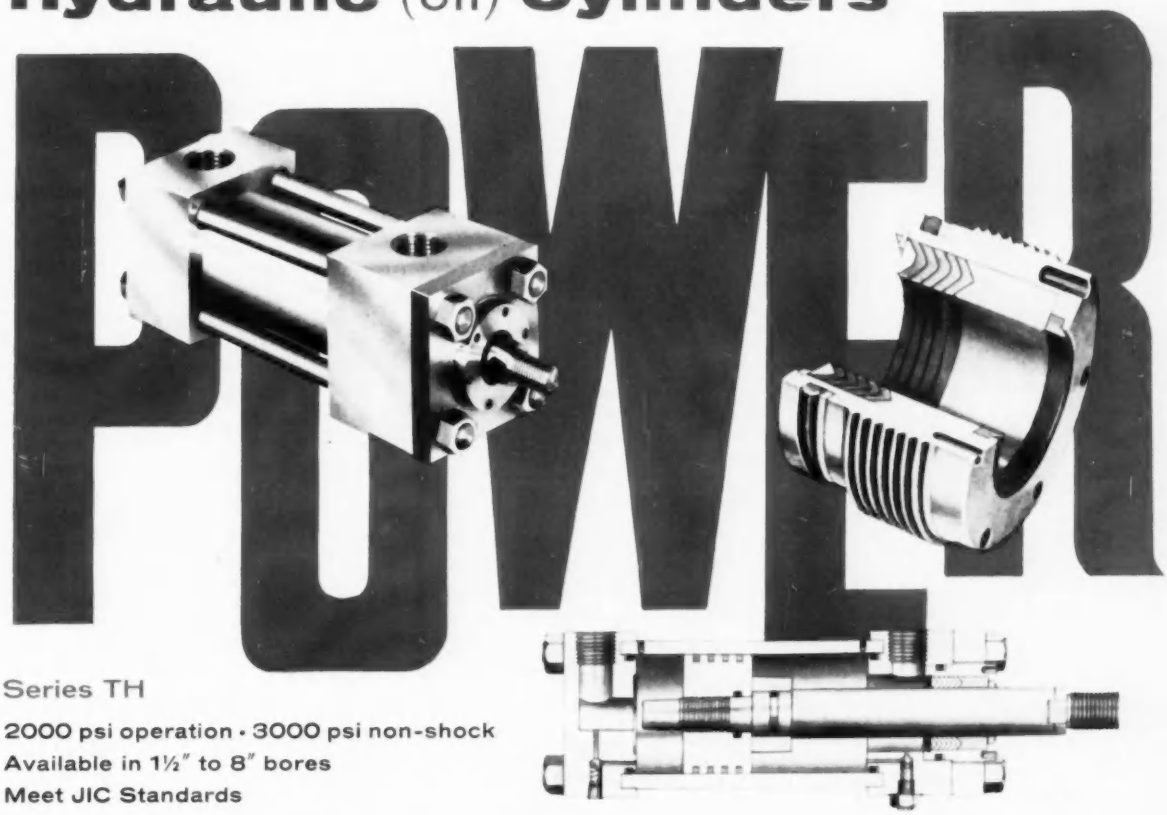

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For example, these units are ruggedly constructed of heavy wall seamless steel tubing microhoned to minimize friction. The ports are large and unrestricted. They can be located at 90-degree positions. These cylinders are sealed right to prevent power loss. The piston rod is stress relieved, turned, ground and polished, high tensile steel, chrome plated. In addition, the rod gland cartridge, accurately piloted in the rod head to assure perfect alignment, is easily unscrewed and removed. Pilot O.D. of cartridge serves as pilot for cylinders mounted on rod end. A cushion ball check valve provides for rapid, full power start of return stroke.

These and many other advancements are described in our latest catalog No. 105. Write for your copy TODAY or consult your local O-M representative.

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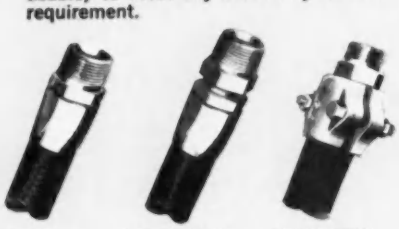
ONE SOURCE . . . ONE QUALITY

the finest in HOSE and
HOSE ASSEMBLIES

hose assemblies

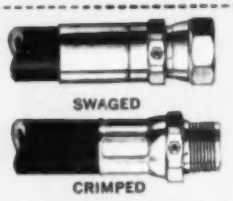
Weatherhead offers a wide selection of hose assemblies, bulk hose, hose ends (both permanently attached and reusable) to meet any and every O.E.M. requirement.

reusable hose ends



STEEL | 2-PC. STYLE | CLAMP-TYPE

permanently attached hose assemblies



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TUBE-HOSE ASSEMBLIES

Weatherhead perfected swaging and crimping machines permit O.E.M. production of quality permanent hose assemblies at low, low cost. Write for information or quotation.

bulk hose

Over 20 different types for every industrial use. Standard hoses listed meet majority of needs.

H-17 (S.A.E. 100R3)

Two-Fibre Braid. Medium Pressure. 560 to 1250 p.s.i. working pressure. ¼" to 1" I.D.

H-69 (S.A.E. 100R5)

One-Wire Braid. Medium High Pressure. 350 to 3000 p.s.i. working pressure. 3/16" to 1-13/16" I.D.

H-9 (S.A.E. 30R2)

One-Fibre Braid. Low Pressure. 300 to 400 p.s.i. working pressure. ¼" to ½" I.D.

H-25 (S.A.E. 100R2)

Two-Wire Braid. High Pressure. 1250 to 5000 p.s.i. ¼" to 1½" I.D.

H-108 (S.A.E. 100R1)

One-Wire Braid. Medium High Pressure. 1250 to 2750 p.s.i. working pressure. ¼" to ¾" I.D.

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In Canada:
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(*Continued from page* 80)

Other Automotive Chemicals

Aside from its research work in the fields named above, Dow conducts similarly intensive programs in other chemicals and compounds for the automobile industry. A good example is the research carried on at the Fuel and Lubricant Laboratory at Dow's Texas Division, Freeport, Tex. To take a case in point, one section of this laboratory spends much of its time in testing fuel and lubricant additives, both petroleum-based and synthesized in its own facilities. For this and its other automotive chemical development programs, Dow has invested in a large complement of technicians and an immense variety of specialized equipment.

Many Dow chemicals have compiled long records of service in automotive manufacturing. Dow caustic, for example, is used to clean numerous types of parts and equipment in automotive manufacturing plants. Dow chlorinated solvents, noted for their almost complete absence of fire hazards and their low toxicity, are employed for specialized metal cleaning operations. Two new grades of trichloroethylene are widely used in vapor degreasing operations to clean gears, tappets, and similar parts. To these may be added the bulk quantities of paint removers, plastic molding materials, and paint and coating materials used in many phases of automotive production. Chemicals and cars obviously go hand in hand. ■

OBSERVATIONS

(*Continued from page* 60)

pers dealing with various aspects of governors for motor vehicles; and the practical reasons for installing them. In this connection it is of interest to readers of this column that the August 15 issue of AI will describe a unique family of V-type gasoline engines being placed in production by one of the leading truck manufacturers. Governors will be standard equipment on all engines of the family, except one version of a small model. Of special interest is the fact that the two larger engines have hydraulic governors patented and

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MORE TYPES OF FASTENERS Continental Assembly Specialists are unbiased toward any particular types . . . Continental makes all types. The fastener they recommend for your job is the one proved best by careful cost analysis.

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In 6, 8, 13, 15 and 30 watt sizes. 18" handles available.
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Originator of aircraft fluorescent ballast systems

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AUTOMOTIVE INDUSTRIES Goes into Leading Plants in the Automotive and Aircraft Industries

made by the same manufacturer. It has a simple spinner valve in the housing of the engine oil pump, responsive to centrifugal force. Oil pressure, upon attaining governed speed, is transmitted through an oil line directly to a diaphragm mounted on the carburetor body with linkage for operating the throttle blades. The entire concept sheds further light on the need for governing heavy duty engines.

Tire Progress

We learned at National Standard that tire companies are grooming butyl tires for passenger cars use. Butyl appears to have many important advantages. Too the company has developed a hex-bead for use in heavy duty tires. It's in conjunction with a tire construction employing just one ply of steel cord instead of the multiple steel plies used heretofore. This new type of tire promises to extend heavy duty tire life materially. Even more important is the fact that the tire can be recapped many more times, thus extending the life of the initial investment for hundreds of thousands of miles. ■

MACHINERY NEWS

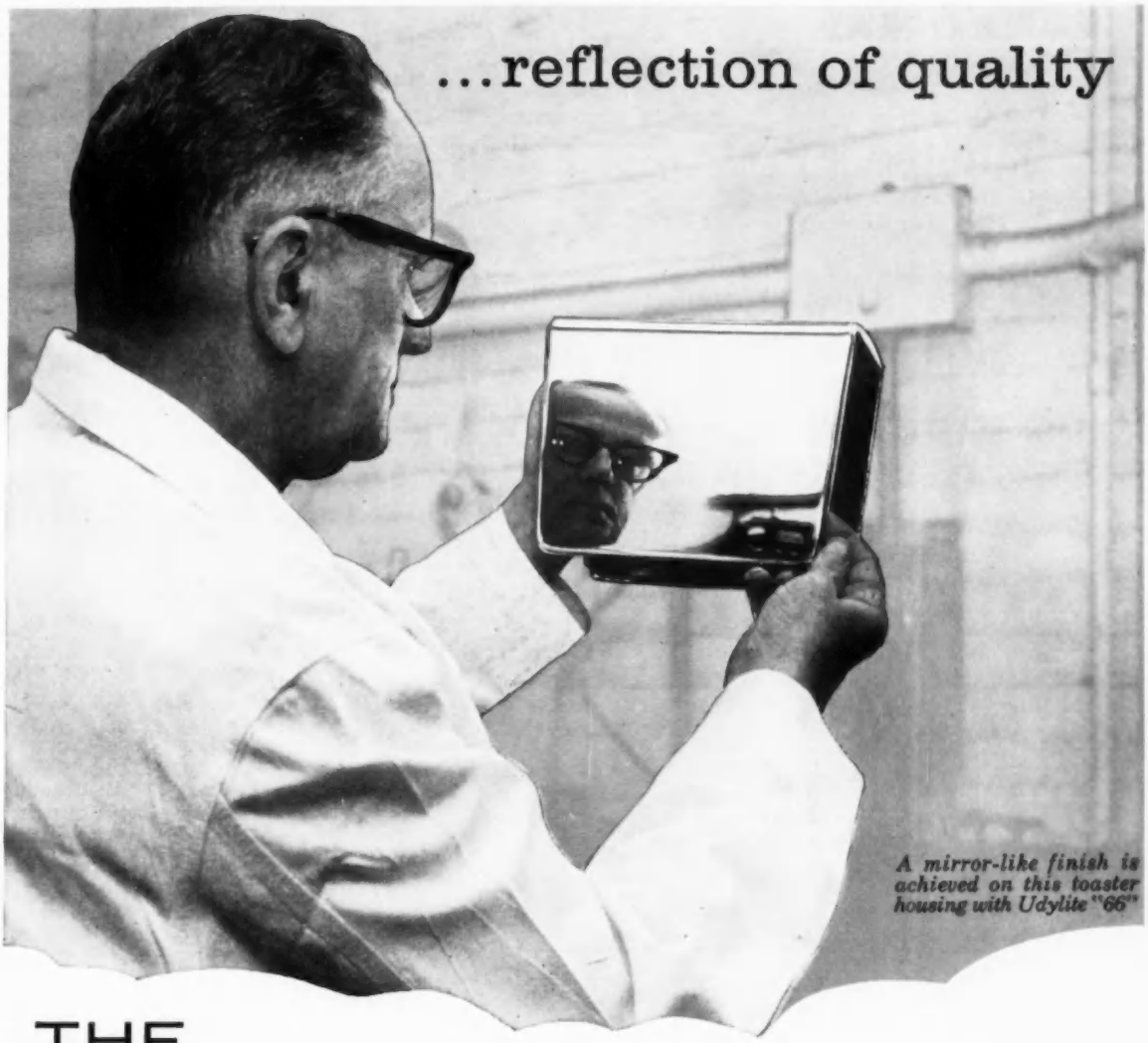
(*Continued from page* 64)

be headed by Paul W. Leming, former executive vice-president of the machine tool division. Selby F. Greer has been named executive vice-president in charge of sales.

Pratt & Whitney Co.—Jacob J. Jaeger was recently elected president. He succeeds Edward P. Gillane, who has been elevated to the position of assistant to the chairman of the board. Edward J. Shages, vice-president in charge of manufacturing, was elected to the board of directors.

Norton Co.—has purchased the inventories, machinery and equipment, together with designs and certain other assets of Gould & Eberhardt, Inc. These assets will

(*Please turn to page* 86)



A mirror-like finish is achieved on this toaster housing with Udylite "66"

THE INCOMPARABLE "66"

Udylite's Bright Nickel Process "66" is sweeping the country with new installations and conversions to provide a truly incomparable plate with almost unbelievable ease of operation. The color of the process alone, sells "66" in any comparison.

The production of your existing equipment can be *greatly increased* with the introduction of Process "66". Its outstanding qualities include exceptional levelling ability and remarkable ductility for so bright a finish.

In addition, Process "66" has overcome the problems previously considered inherent in plating over semi-bright nickel and, it is unusually receptive to chromium. You'll find that the amazing adaptability of this very bright finish makes it suitable for your finest work . . . moreover it will save you money.

A phone call or letter will start Udylite's "66" Bright Nickel process on its way to help you improve your production. If it sounds too good to be true, just send us a sample of your product . . . we will be happy to test-plate it for you with Incomparable "66". Act TODAY!

SUPER "66" For even greater brightness and levelling where absolute maximum ductility is not demanded, Udylite's SUPER "66" may be specified. You must see this finish to believe its brilliance.

the udylite corporation

detroit 11, michigan • world's largest plating supplier

MACHINERY NEWS

(*Continued from page 84*)

be moved, in the near future, to Norton's machine tool plant in Worcester, where manufacture of the G&E line of shapers and gear hobbing machines will be continued.

Warner & Swasey Co.—has created a new Marketing Services Dept. to coordinate and control all areas of the company's marketing activities not directly connected with field selling. Baxter Fullerton, former assistant to the vice-president in charge of sales, heads the new department. His responsibilities will include advertising, market research and statistics, sales promotion, product publicity, and other marketing functions apart from actual selling.

R. K. LeBlond Machine Tool Co.—Robert E. McKee has been appointed sales manager. ■

LATEST DEVELOPMENT IN LP-GAS CARBURETION

New Chokeless Carburetor for...

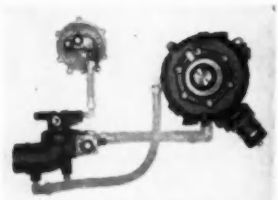
LIFT TRUCKS, SMALL TRACTORS and POWER UNITS

Here for the first time, the LP-Gas industry is offered a chokeless carburetor for small gas engines which needs no priming! Designed especially for the mass market in the Lift Truck, Tractor, and Power Unit fields, the carburetor known as the Ensign Model "CL" is used in conjunction with Ensign Model "RW" liquid vaporizer-regulator or Ensign Model "VP" two-stage vapor systems. Its simplicity of design and easy adaptability make it ideal for field conversion.

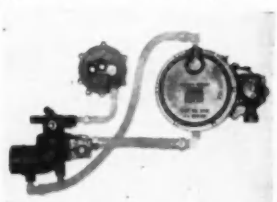
Conventional choking and priming mechanisms are eliminated. No idle line is required. Fuel for idling comes through the main gas supply line. Installation costs are therefore reduced.

The Ensign chokeless carburetor illustrated is equipped with a highly effective part throttle economizer, and interchangeable venturii for easy adaptation of the carburetor to various engine specifications. Insist on Ensign, accept nothing less.

Send for complete details today.



for Liquid withdrawal systems



for Vapor withdrawal systems

ENSIGN CARBURETOR COMPANY
1551 E. Orangethorpe, Fullerton, California
Branch Factory: 2330 W. 58th Street
Chicago, Illinois

Send for complete information on LP-Gas carburetion for small gas engines.

At least 2,000 potential saboteurs threaten U. S. Defense plants, Congress is warned. But the tangled status of industrial security prevents removal of these dangerous employees.

Defense Dept. contracts do not bar employment of Communists in a defense plant—if they do not have access to classified material. Bill to provide safeguards against the risky workers remains untouched by Congress, after nearly six months.

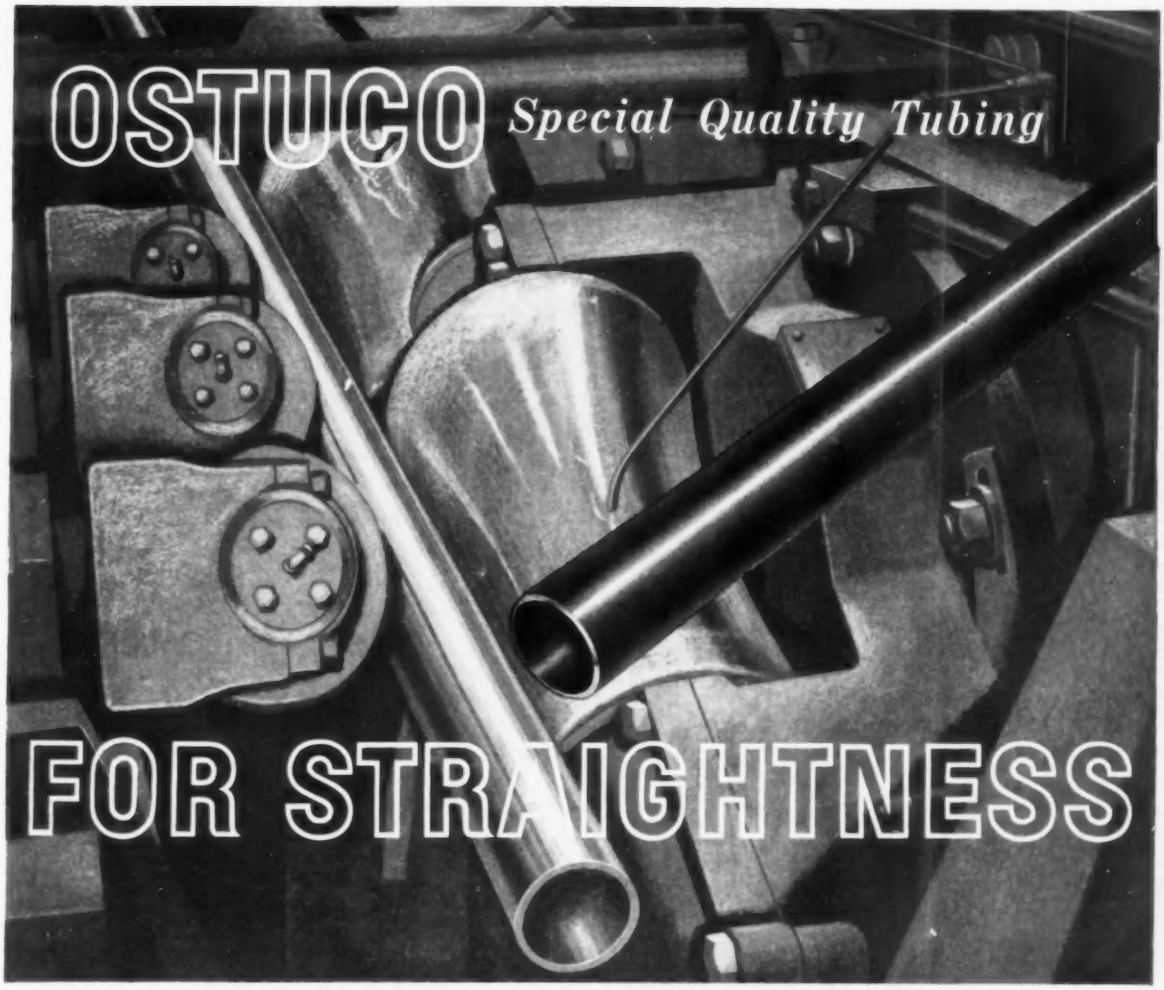
Oceanic research speedup to bolster U. S. industry and defense is urged in the Senate. Senate Commerce Committee approves a resolution calling for expanded studies and better charting of the ocean depths.

Studies may be needed merely to tell the U. S. what Russia already knows about waters near American shores. Warnings are out that the Russians have charted Pacific waters to points just off U. S. coast.

Difficult times are still ahead for the so-called master plan for air defense. Plan cuts back authorizations for antibomber missiles and boosts those for an antimissile weapon. Senate has agreed with the concept. But some congressmen assail the plan for putting too much emphasis on defensive measures. Congress also asks whether it would be advisable to explode missiles with atomic warheads over crowded U. S. areas.

Administration officials are more convinced than ever that Frol Kozlov is to be Nikita Khrushchev's successor. Reasoning: Kozlov's tough talk in Washington: his aping of the blunt, stubborn Khrushchev tactics in bargaining, his prestige buildup in Soviet press, radio, and TV in recent months.

Helicopter Manufacturer Specifies



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"Our specifications for seamless steel tubing used in rotor drive shafts are tough to meet. In addition to stringent O.D., wall and concentricity tolerances, we require *special straightness* — tube after tube, shipment after shipment.

"Ohio Special Quality Tubing surpasses any other tubing we have ever used. We know this to be fact. Scrap and rejects are at a new low, inspection OK's and savings on this part are at a new high."

This actual case history may parallel your own product problems. For with Ohio Special Quality Tubing it's only the *quality that's special.* For further information contact our nearest sales office, listed in the Yellow Pages, or the plant at *Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.*

AA-9011

OSTUCO TUBING

OHIO SEAMLESS TUBE DIVISION

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(Advertisement)

This series of reports is published to coordinate the mutual interests of automotive manufacturers, gear lubricant producers and the Military in the general adoption of the new improved gear lubricants now available from coast to coast.

The table at right shows the variations of drain-and-refill practices between the 1959 popular makes of cars and trucks:

Report No. 5:

Performance guarantee of the new gear lubricants classified commercially as "GL-4"

The host of favorable service reports accumulated over 3 years show that passenger car and truck axles obtain excellent lubrication from the new, improved gear lubricants. The new gear oils are such a significant advancement over earlier lubricants that the American Petroleum Institute has established a special classification designated "For Service GL-4."

While virtually all commercial brands of gear oils designated GL-4 will meet or even exceed the new Military specification, some spokesmen for the automotive manufacturers have been reluctant to accept the commercial classification, "GL-4," since a specification has not been attached to this designation.

There are several basic reasons why gear oil producers are reluctant to label their products with a specification rating. Chief among these: such a specification immediately "levels" brands to a common denominator; marketing under such conditions is reduced to price-dueling. Some of the highest quality gear oil producers resist such common specification . . . believing with reason that their brand name behind the product is the users' guarantee of performance. Certainly this attitude is understandable.

There are today 31 gear oil producers whose lubricants meet the current demands for high-speed and high-torque axle lubrication. With drain plugs reinstalled on all models and with service manuals directing regular gear oil replacement, the oil companies and gear lubricant manufacturers will have even more incentive to improve their products. Under the present conditions, improvements of product must be supported by faith that at some time a market worthy of this investment in research will be created.

If that market were opened wide now, on the basis of the good performance that GL-4-type lubricants will deliver—so that branded products could compete on the basis of constant improvement—the probability of developing the "completely multi-

MAKE	Fitted With Differential Drain Plug	Service Manual Recommended Drain-and-Refill
CARS		
BUICK	No drain plug	No drain recommended
CADILLAC	No drain plug	No drain recommended
CHEVROLET	Yes	*10,000
CHRYSLER	Yes	20,000
DESOTO	Yes	20,000
DODGE	Yes	20,000
EDSEL	Yes	No drain recommended
FORD	Yes	No drain recommended
LINCOLN	No drain plug	No drain recommended
MERCURY	Yes	No drain recommended
OLDSMOBILE	No drain plug	No drain recommended
PLYMOUTH	Yes	20,000
PONTIAC	No drain plug	No drain recommended
RAMBLER	No drain plug	No drain recommended
STUDEBAKER	Yes	10,000
TRUCKS		
Chevrolet	Some models only	*15,000
Dodge	Yes	20,000
Ford	Yes	10,000
G.M.	Some models only	10,000
International	Yes	10,000
Studebaker	Yes	10,000
Willys	Yes	10,000

* Drain factory-fill at 1,000

The new gear lubricants which now warrant the re-establishment of regular drain-and-refill of axle differentials represent a major technical advance to which the following agencies contributed:

The Coordinating Research Council
The American Petroleum Institute
Office of Chief of Ordnance
Staff Technologists of
Chrysler Corp., Ford Motor Co.,
General Motors Corp., Spicer Axle
Company, Timken-Detroit Axle Co.
Armour Research Foundation
Southwest Research Institute
Lubrication Research Engineers of
major oil companies and gear lubricant
additive manufacturers.

purpose lubricant" would be vastly enhanced. Understandably, no manufacturer will long continue to research product improvements for a negligible or non-existing market.

Oil companies and their associated facilities have today provided the automobile industry with the quality of gear lubricants required. These lubricants have demonstrated their ability to perform in the new high-speed passenger cars and heavy-duty trucks. Only the automobile manufacturing industry, however, can open the commercial market for which these lubricants were developed. By stipulating regular drain-and-refill practices in the service manuals, automotive manufacturers will stimulate continued research for new and better gear lubricants.

If you would like copies of the five reports that appeared in this series, write: Monsanto Chemical Company, Petroleum Chemicals Department, St. Louis 66, Missouri. Ask for the report on "IMPROVED GEAR OILS."

The additives for Monsanto® *formulating these improved gear lubricants are sold competitively in ample commercial supply.*

Circle 142 on Inquiry Card for more data

New Sundstrand Multiple Spindle Drilling and Boring Machine Offers Precision at Low Cost

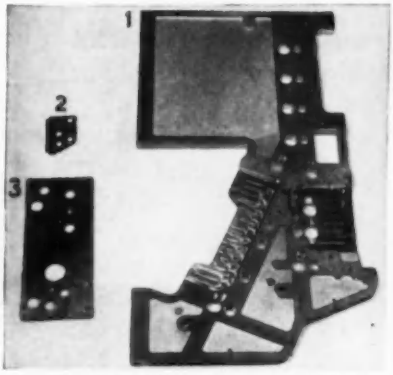
Sundstrand's new precision drilling, boring reaming and tapping machines, permit higher accuracies and lower costs in producing large numbers of holes on relatively complex parts. Unique design of the work heads eliminates all gearing, permitting close center distances, reducing cost of interchangeable work heads, and speeding change-overs.

Two models are available with either an 18 x 36-inch head or a 9 x 14-inch head. Machines are designed primarily for work with nonferrous metal parts.

Complete work heads can be changed in 15 to 20 minutes and additional flexibility for similar parts is offered by equipping heads with spindles that can be fitted quickly with a tool as required.

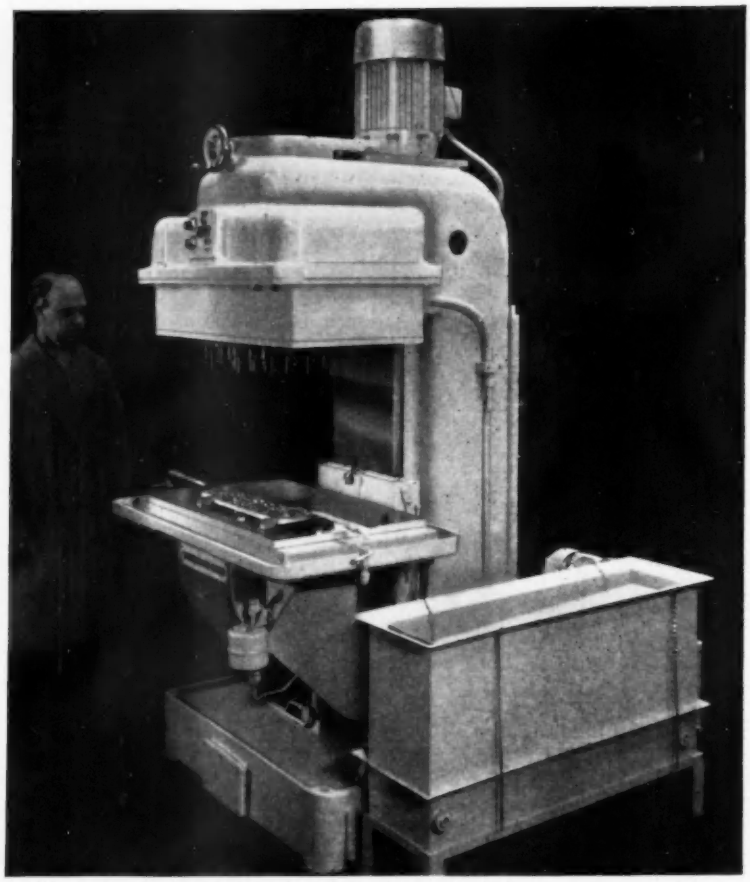
Unique design enables relatively low cost spindles to be used while maintaining the highest standards of accuracy. Furthermore, in the event of a change over in work being handled, approximately 75% of an obsolete head can be salvaged and applied to other jobs.

Highly skilled operators are not required to hold tolerances to .0002 inch for spatial relationship, shoulder depth and hole size — depending on size of part, shrinkage, expansion, material composition, tool maintenance, etc. Inspection requirements are greatly reduced because spatial accuracy is built into the head, fixtures, and machine itself.



Typical parts show wide range of work handled on new multiple spindle machine. Additional data is given in table on facing page.

Following initial inspection of tooling and a check of first parts produced, subsequent parts need only be checked for hole size and shoulder depth. Where spatial relationships are extremely critical occasional spot check is generally all that is required.



New Sundstrand multiple-spindle machine offers precision and simple change over, does not require highly skilled operator.

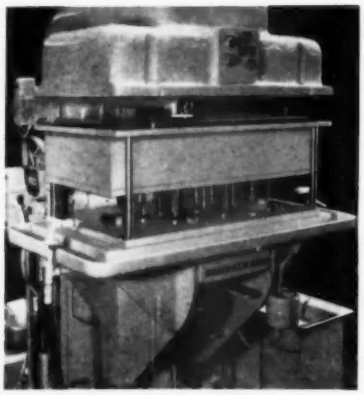


Table is lowered to take new work head in change over then is elevated until coupling on drive spindle mates with machine spindle. Dowels insure accurate alignment, four bolts hold head in place.

Even change-overs take no special operator skills since the head mates with the machine spindle, is located by dowels and is held in place by four bolts. The work-holding fixture is positioned quickly and simply in relation to the work head.

Surface speed at the largest hole being machined with a particular head determines all spindle speeds.

"Engineered Production" Service

SUNDSTRAND

TYPICAL PERFORMANCE DATA

JOB NO. 1 — ALUMINUM SIDE PLATE — 32¾" x 17" x ⅝". Seven heads are used to drill and chamfer 138 holes and to perform semifinish and finish boring, counterboring, and reaming operations on selected holes. Tolerances in most critical holes are +.0005, −.000 for size and ±.001 for location. Total machine time 4 minutes.

JOB NO. 2 — ALUMINUM BEARING PLATE — 2.4" x 3.9". Stamped part has over 30 small holes and four large holes precision bored to +.0002, −.000 for size and ±.0001 for location. Total machine time 7 minutes.

JOB NO. 3 — ALUMINUM SIDE PLATE — 12½" x 5" x ¾". Large holes previously rough drilled. All small holes are drilled, critical holes are semifinish bored, 2 holes are counterbored, and in final operation all critical holes are finish bored to +.0005, −.000 for size and ±.001 for location.

This does not impose any limitation on production as no other method will produce an equal number of holes at as low a unit cost and with the same high degree of accuracy.

Feed rates for drilling, rough and semi-finish boring in aluminum and magnesium are .005 to .008 inch per revolution. Finish boring in the same materials is at .0005 to .001 per revolution. Tapping heads can also be provided with the specific details of the application determined after a study of all the variables.

Multi-cycle 25 hp Lathe Announced

Sundstrand's new Model 14T-25 lathe handles three roughing and a finishing cut with a single template in a fully automatic cycle and insures exceptional accuracy of finished work because stylus and cutting tool are closely coupled to reduce deflection and related errors. Setup times are reduced and accuracy is increased by graduated scales provided for dog setting, template positioning, tailstock positioning, and cross facing slide location.

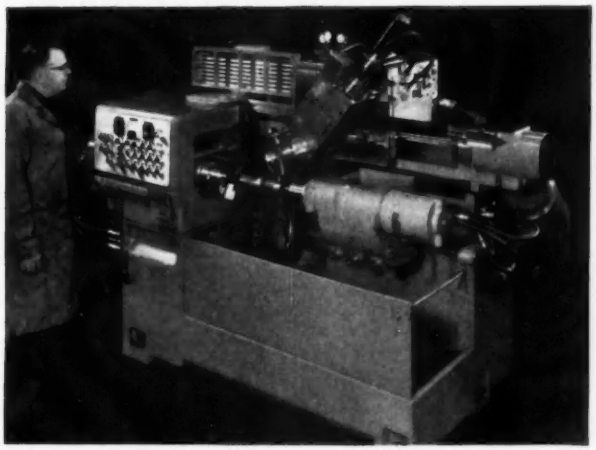
Dial indicators at the top of the tracing carriage permit depth of cut to be set accurately. At the completion of three roughing cuts, the tool turret indexes automatically to take a .020-inch finishing cut.

The Model 14T-25 is designed with the rigidity and spindle speeds required to use carbides for the roughing cuts and ceramic tooling on the finishing cut. Either two or four speed transmission-type heads are considered standard with eight speed heads available on special order.

Work area is readily accessible to simplify loading by operator or addition of automatic workhandling equipment. Sundstrand Model 14T-25 lathes are available with 24, 32, or 40 inches length between centers and offer a maximum turning diameter of 4½ inches. Facing slides with separate feed unit permitting operation at any time during machine cycle are available as optional extras.

Rough forging and finish turned shaft produced on Model 14T-25 lathe. Two setups handle complete part.

Stem pinion forging is turned in two setups with production rate determining whether one or two lathes handle the job.



Newly designed Model 14T-25 Sundstrand tracer lathe provides three roughing and one finishing cycle automatically.

SUNDSTRAND MACHINE TOOL

DIVISION OF SUNDSTRAND CORPORATION

BELVIDERE, ILLINOIS

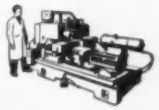
SUNDSTRAND

More facts about

SUNDSTRAND

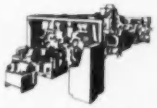
"Engineered Production"

Literature listed under various machine types has more details. Write Sundstrand for your copy today.

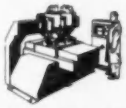


Automatic and Tracer Lathes
Bulletin A-106

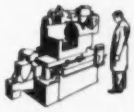
Engineered Milling Production
Bulletin B-106



Examples of Transfer Machines—Bulletin C-106



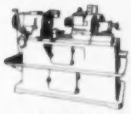
Multiple-spindle Drilling Machines—Bulletin D-106



Internal and Rotary Surface Grinders—Bulletin E-106

Broaching Tools
Bulletin F-106

Practical Broaching Methods
Bulletin F-106



Thread Milling
Bulletin G-106

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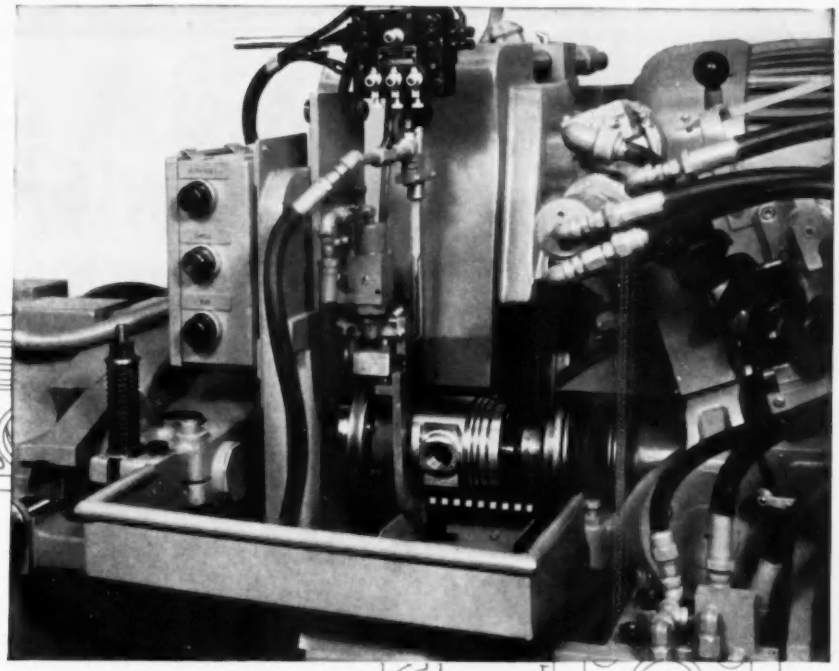

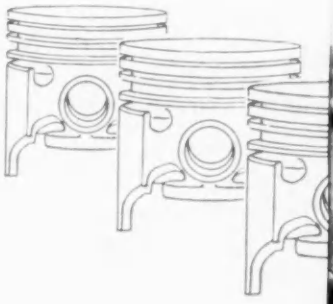

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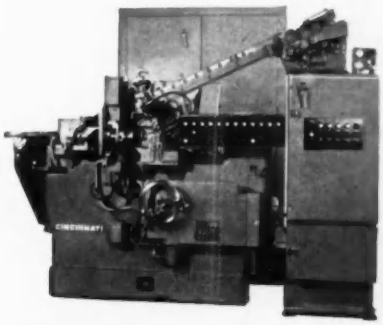

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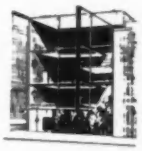
A CHILTON  PUBLICATION

INDEX TO ADVERTISERS

This Advertisers' Index is published as a convenience and not as a part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert. When writing to advertisers please mention AUTOMOTIVE INDUSTRIES

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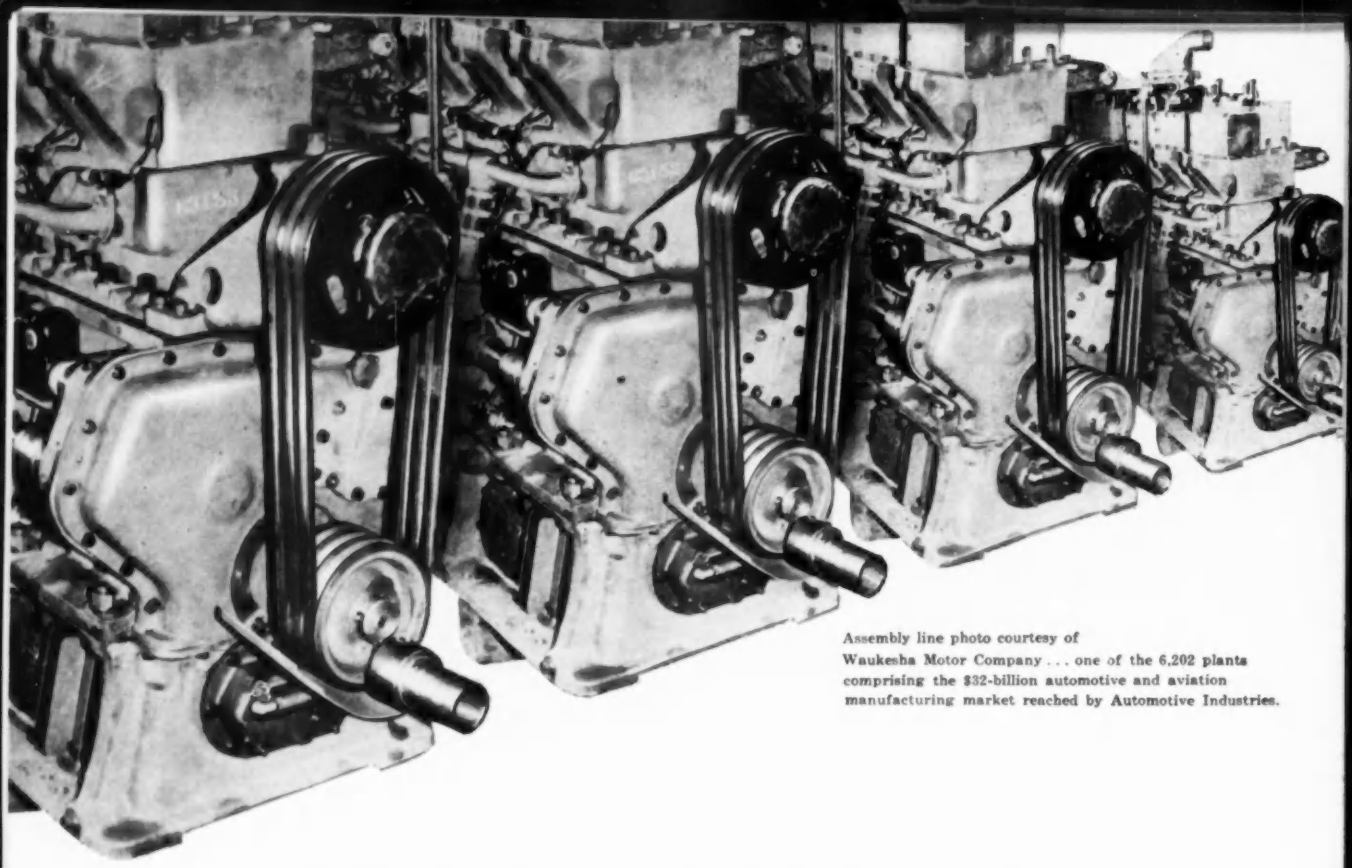

Assembly line photo courtesy of Waukesha Motor Company . . . one of the 6,202 plants comprising the $32-billion automotive and aviation manufacturing market reached by Automotive Industries.

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FREE LITERATURE

Deep-Groove Bearings 1

Bulletin 110, published by the *Hoover Ball and Bearing Co.*, provides complete information about the many types and sizes of Hoover deep-groove ball bearings. Dimensions, loads, and other application data for the bearings are included in the 12 page bulletin.

Universal Grinder 2

Catalog S-59, 16 pages, describes and illustrates the Landis 12 by 28 in. Grindwell universal grinder which is a general purpose cylindrical precision grinding machine for use in small lot manufacturing in both large and small shops, tool rooms, maintenance departments, and for training purposes. *Landis Tool Co.*

Measuring Instruments 3

Bulletin 1310, 16 pages, lists an entire line of dynamic-measuring and recording instruments, including oscillographs, data amplifiers and bridge balances; vibration measuring equipment; and power supplies. *Consolidated Electrodynamics Corp.*

Welding Machines 4

Bulletin 4608.1 describes operating features, construction details, and applications for a line of welding machines. The machines can be used for all welding applications: DC manual electrode, AC manual electrode, DC inert gas, and AC inert gas. *The Lincoln Electric Co.*

Enclosed Gear Drives 5

A four page folder, prepared by *Foote Bros.*, gives information on their line of enclosed gear drives. Among the items discussed are: motorized drives, shaft mounted drives, Hygrade worm gear drives, Maxipower parallel shaft drives, and worm-helical vertical gear drives.

Photoelectric Control 6

Bulletin GEA-6822, 16 pages, describes a full line of controls for industrial counting, sorting, signaling, protecting, diverting, detecting, or limiting jobs. Included are descriptions, and pricing data on a self-contained relay, high-speed relay, explosion-proof relay, and other electrical devices of these types. *General Electric Co.*

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FREE LITERATURE—*Continued*

Coatings 7

A brochure on the applications and economics of spray-on, strip-off coatings, has been published by the *Spraylat Corp.* The brochure stresses the advantages of strippable coatings in protecting finishes of metals, plastics, glass, rubber, ceramics, and painted or enamelled surfaces, against weathering and abrasion.

Spring Steel 8

Physical data for users of cold-rolled high-carbon flat spring steels is a feature of Catalog 579 issued by the *Athenia Steel Div., National-Standard Co.*

Fork Truck 9

A four page bulletin, illustrating and describing its 2000 lb capacity, electrically powered fork truck, has been published by *The Elwell-Parker Electric Co.*

Marking Machines 10

Steel and metal marking machines and tools, name-plate stamping machines, hand operated, pneumatic and motor driven marking and numbering machines, etc. for marking metal, plastic, paper, wood, and other materials, are all presented in a condensed "pocket" catalog available from *The Acromark Co.*

Die Head 11

Bulletin F-90-4 includes detailed information and specifications on the JN Landex die head which is suitable for application to automatic screw machines, chucking machines, or other machines incorporating a revolving threading head, and the De Landmatic, specifically designed for application to Brown & Sharpe automatics. *Landis Machine Co.*

Handling Equipment 12

Booklet 2008-0 covers various types of carriers, cranes, tractors, track switches, grabs, and electrification which pertain to a line of overhead materials handling equipment. *The Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co.*

Control System 13

How to achieve more work per hour from lift trucks through simplified operation, faster maneuvering, increased safety, and more operator efficiency is explained in a brochure recently prepared by the *Hyster Co.*

Vinyl-Metal Laminates 14

Information on vinyl-metal laminates and their applications are described in detail in an eight page brochure published by *Arvin Industries, Inc.* Included is information on the range of material to which vinyl can be laminated.

Titanium Fasteners 15

A cataloging of titanium fasteners and special products and a review of special facilities are featured in a 12 page technical bulletin from *Standard Pressed Steel Co.*

Molded Cups 16

Bulletin AD-145 describes a line of molded cups for pump pistons, hydraulic service, and for pneumatic equipment. The booklet details the construction, service, and sizes of rubber, synthetic rubber, metal bonded, and metal reinforced and homogeneous cups. *The Garlock Packing Co.*

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FREE LITERATURE—
continued

Slitter Brochure 17

A revised 76 page brochure entitled "Slitting Lines for Coils and Sheets" has been prepared by the *Yoder Co.* The two part book contains basic information on design, selection, and operation of slitters and slitting lines.

Hydraulic Valves 18

Waterman Engineering Co. is offering a 12 page catalog of filters, check valves, unloading valves, relief valves, and fuses for hydraulic power systems.

Nickel Tubing 19

The chemical composition, physical constants, and mechanical properties of four types of nickel tubing: "A" Nickel, Low Carbon Nickel, "D" Nickel, and Duranickel, are listed in Folder CM-359. *Superior Tube Co.*

Unitized Motors 20

Bulletin GEA-6882, 12 pages, describes and discusses features of a line of unitized motors. Efficiency, bearings, and the insulation system is described, along with versatility of the new motors. *General Electric Co.*

Servoactuators 21

MOGG Servocontrols, Inc. has published Catalog 170 which describes their line of electrohydraulic servoactuators. These units are custom designed integrated packages which provide compact, lightweight and reliable power control for electrohydraulic servo systems.

Bar Automatics 22

The Cleveland Automatic Machine Co. has published Bulletin B-358 which gives a detailed description and specifications of their 1-⅝ and 2-½ in. capacity Model B and Model B-18 in. automatics. These machines are suited for work involving multiple diameters, shoulders, and tapers, etc.

(Please turn page)

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Flowmeter Catalog 23

A catalog that combines basic information on a complete line of flowmeters, flowsticks, and manometers is announced by *Seico Instrument Div., Eclipse Fuel Engineering Co.* The flowmeters are available for gases only, liquids only, and for combined liquids and gases.

Machining Service 24

A service for the ultrasonic grinding and machining of production quantities of hard and brittle materials such as glass, quartz, ceramics, carbides, hardened tool steel, ferrite, and similar materials is described in Bulletin UG559. *Precision Glass Products Co.*

International Inch 25

Pratt & Whitney Co., Inc. announces publication of a booklet that describes the various problems that a manufacturer can be expected to encounter as a result of America's changeover to the international inch as of July 1, 1959.

Centerless Grinder 26

The Norton No. 2 straddle-bearing centerless grinder for the numbers of operations where parts can be cylindrically ground, without centers, is described in detail in 15 page Catalog 1328. *Norton Co.*

Screw Feed Machine 27

The Baush M-20 mechanical screw feed multiple spindle drilling and tapping machine is covered in a four page brochure. The machine is arranged to provide for a complete automatic cycle for high production, a semi-automatic cycle for low production, and a jog cycle for set-up. *Baush Machine Tool Co.*

Hydraulic Pallet Truck 28

Circular 26C describes a 2000 lb capacity lightweight hydraulic pallet truck. Features of the truck include: 360 degree operation of the tow handle; high location of the handle pivot for easy pulling; no grease points; lubricated for life, and a high pressure hydraulic foot lift pump. *Lewis-Shepard Products, Inc.*

NEW... adjustable 3/4" Deceleration Valve

Simplifies Cam Design, Cuts Set-up Time, Eliminates Need for Special Valve Spools...

These Features are Important to You:

- Controlled deceleration regardless of flow rate
- Reduces set-up time—eliminates experimenting with cam shapes
- One valve can handle all applications from 5 to 25 gpm giving greater flexibility
- Regulates initial deceleration pressure—eliminates wasted spool movement
- Can be used for applications to 60 gpm without malfunction
- Includes adjustable by-pass needle valve
- Available with or without check for reverse free flow
- Threaded ports or subplate mounting

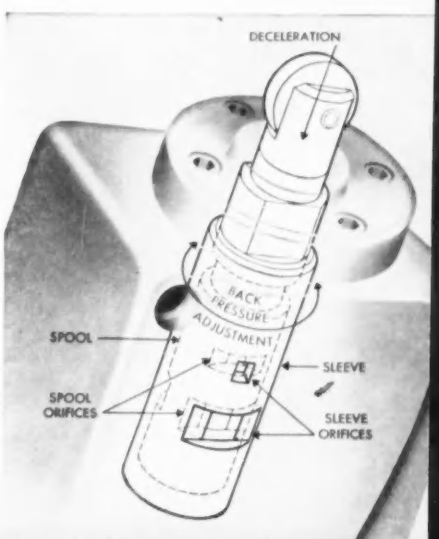
TYPICAL USES:

1. Converting rapid traverse motions to slow, controlled feeds.
2. Rotary indexing operations. Will control deceleration and permit creep to accurate final position.
3. Straight-line transfers. Deceleration control gives smooth stop without excess movement of part being transferred.

Write for installation drawings No. 214322 and 1-214323.

Orifice size (through spool and sleeve) is made larger or smaller by rotation of sleeve. Adjusting screws on the face of the valve rotate the sleeve to the required orifice opening. Deceleration stroke length remains unchanged. No special cam shape is required for valve spool travel.

Patent Pending.



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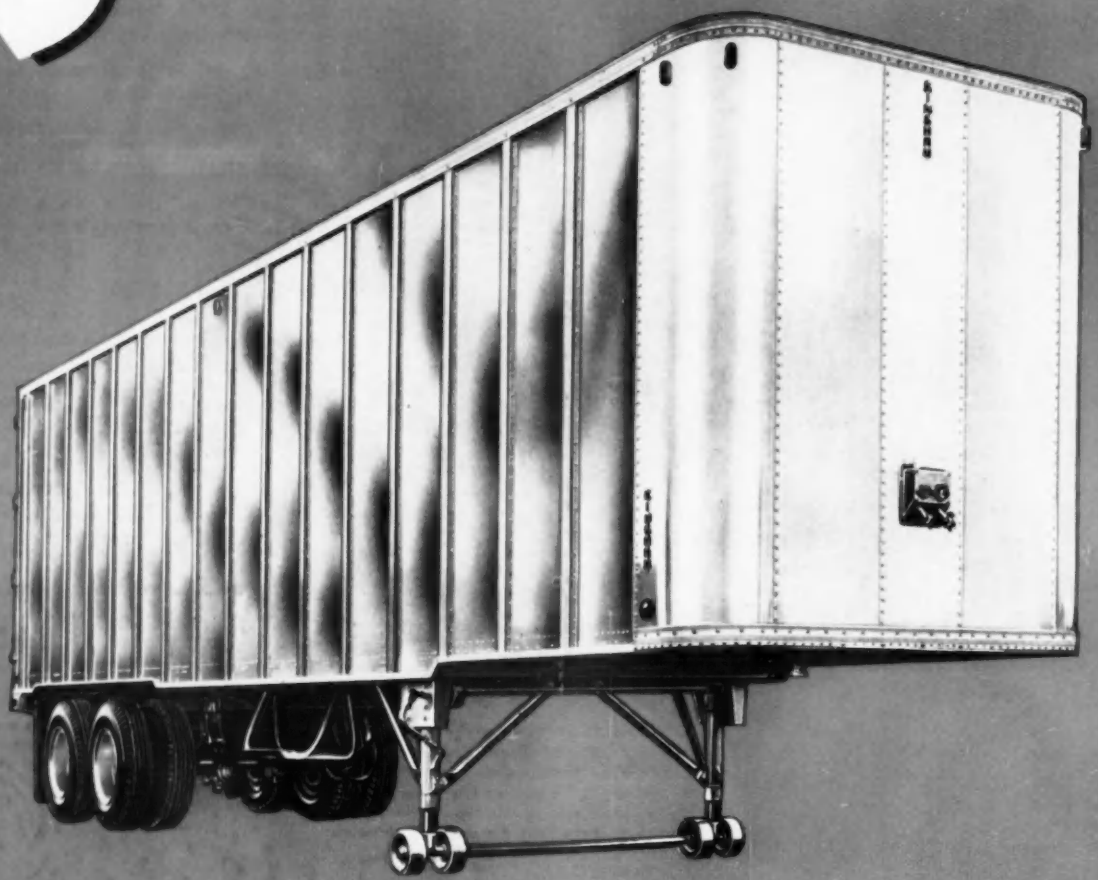

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